सत्यमेव जयते

REPORT ON DEVELOPMENT OF NORTH-EASTERN REGION

NATIONAL COMMITTEE
ON
THE DEVELOPMENT OF BACKWARD AREAS

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SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

I. INTRODUCTION

1. *The North Eastern Region, comprising of the States of Assam, Manipur Meghalaya, Nagaland and Tripura and the Union Territories of Arunachal Pradesh and Mizoram, does not fall into a separate category of backwardness. Much of the region will be covered under one or the other category of fundamental backwardness. Specifically three types of fundamental backwardness are found in the region viz., areas of tribal concentration, hill areas and chronically flood affected areas.* [PARA 1.3]

2. *As far as industrial backwardness goes, the whole of the north-east has been categorised as industrially backward as per the National Committee's Report on Industrial Dispersal.* [PARA 1.3]

II. CHARACTERISTIC FEATURES OF THE REGION

3. *The first and most marked characteristic feature of this region is the low density of population in all areas other than Assam and Tripura. The very low densities in many parts of the region are attributable to the nature of the terrain. The second marked characteristic of the population of this region is its rapid rate of growth which has tended to be substantially higher than the national averages. The third important characteristic of the population of this area is the high proportions of scheduled tribes.* [PARAS 2.8, 2.9, 2.11 AND 2.12]

4. *Considering the fact that the total tribal population of the area is only 4.35 million, there are a large number of relatively small tribes. Many of the tribes cut across not merely State boundaries, but also international boundaries. Thus, there is a great deal of heterogeneity of population within the area.* [PARA 2.14]

5. *The ability of the tribal community to benefit from the job opportunities generated through development process is substantially greater in the north-east than in the other tribal areas. There is a stock of educated youth who, if trained, can take up positions in development, administration, industrial projects etc.* [PARA 2.14]

6. *Production for self-consumption and subsistence is the basis for economic activity and calculations on market values are seldom the basis for decisions on what and how to produce. In this connection when the system is opened to market forces the local tribals, even though they may be well educated, may not in fact benefit.* [PARA 2.15]

7. *The processes of non-agricultural development generated in this area do not always benefit the tribals except in the limited area of government employment.* [PARA 2.16]

8. *There are some tribal groups which have had long tradition of contact with the market economy and they are in a better position to cope with the opening up of their economies, There are, however, many other groups which have lived a more isolated existence who may well lose out if they are exposed to uncontroiled market forces. These variations in the ability of different tribal communities to cope with a new economy have to be taken into account in any development strategy.* [PARA 2.17]

9. *The high participation rates and the low rates of unemployment mean that there is very little employment slack to be taken up in the hill States. Because of this it has not always been possible to find labour for construction work in the region even at relatively high wages. But it may be noted that this may also be, to some extent, due to lack of organisation for mobilising labour.* [PARA 2.23]

10. *Development plans in the hill areas of the north-east cannot be based on the assumption of an employment slack and the alternative employment generated by new developments in horticulture, plantations, animal husbandry etc., must offer fairly high wages or returns per manday if they are to succeed. The possibility of shortage of candidates for technical and non-technical posts in development administration and in projects must also be kept in mind.* [PARA 2.25]

11. *The problems of development lie not in the lack of natural resources but in the large investments required for infrastructure development, the inadequacy of labour and the necessary skill needing an extensive programme of manpower development.* [PARA 2.26]

12. *The hilly terrain of the north-eastern region and the pattern of land availability has led to two distinct systems of agriculture : (i) settled agriculture in the plains, valleys and gentler slopes and (ii) jhum (slash and burn) cultivation elsewhere.* [PARA 2.32]

13. *The general practice in Jhum areas is that each village has a well-defind range of operation in which the jhum cycle as well as other activity like hunting and wood cutting are confined. Within this area land is allotted to each household on the basis of its capacity or its need, by a village level authority like village council or a chief, guided by village elders.* [PARAS 2.36 AND 2.37]

14. *The hilly terrain in of the north-eastern region offers ample scope for the development of horticulture and plantations. Animal husbandry is an imprtant part of the traditional*

agricultural system. However, the pattern of animal husbandry in hill areas shows a significant difference from the plains and from the general all India pattern. In the traditional non-agricultural sectors of the dominant activities are handloom weaving, sericulture and handicrafts. In the modern sector the level of development is limited. [PARAS 2.43, 2.44 AND 2.46]

15. *From the point of view of infrastructure development the principal problem in the region is the inadequacy of communication facilities.* [PARA 2.48]

III. STRATEGY OF DEVELOPMENT

16. *The north-eastern region is exceptionally rich in natural resources. The primary objective of development strategy must be to utilise these optimally and in a manner that maximises the benefits accruing to local people. This will require not merely additional investments in infrastructure and production facilities but also a programme of manpower development and measures to reorient the system of land tenure in the hill areas.* [PARA 3.2]

17. *The main elements in the development programme for the north-east must be measures to control jhuming, improvements in co-op. husbandry in the flood prone valley, an animal husbandry programme oriented to local conditions, the tapping of the huge potential for horticulture, plantations on forestry, the promotion of sericulture and commercial handlooms, the development of modern industries in a manner that will maximise local impact and the improvement of communications.* [PARAS 3.3 to 3.47]

18. *Most of the States and Union Territories in this region are too small to be able to sustain the full range of expenditure on education and training which is the charge of State Governments in the rest of the country. Hence the special role played by the North Eastern Council in this regard is crucial and should be strengthened.* [PARA 3.50]

19. *Nation-wide leadership will be required to ensure that development is not hindered by lack of necessary technical and managerial personnel and attitudes of parochialism. It is not easy to get top quality personnel from the rest of the country without special incentives. The North Eastern Council can give the leadership in starting a dialogue and laying down the necessary norms in manpower recruitment and appointment for a possible aggressive development policy. The States/Union Territories which are members of the North Eastern Council must honour the concensus reached in the North Eastern Council.* [PARA 3.51]

20. *A quickening of the pace of development in the hill areas of this region carried with it the risk of the tribal being exploited. Protective and promotional measures to avoid this must be an integral part of the development strategy for this region.* [PARA 3.52]

21. *Promotional measures to encourage train and assist trials, particularly the educated and urbanised ones, to utilise the opportunities for small industry, transport operations, trade and other services are equally important. What is required is a supporting structure for credit delivery, marketing raw material supply and technical assistance that can provide a well thought out package.* [PARA 3.53]

22. *The traditional structures like Village Councils can be used to secure the participation and involvements of people in the development effort.* [PARA 3.54]

IV. ADMINISTRATIVE STRUCTURE

23. *The development strategy for this region will require substantial new developments in agriculture, animal husbandry, horticulture, plantations etc. These developments will require the establishment of facilities for research, new training institutions of nurseries, breeding farms etc. At the present stage the optimum size for many facilities would be beyond the requirements of individual States. In these cases the North Eastern Council can set up these facilities to serve several States thereby allowing these States to benefit from economies of scale.* [PARA 4.6]

24. *The new developments to be promoted in different sectors will also require a close link up between basic research, adaptive research, field trials and extension effort. The North Eastern Council can do this in the form of pilot projects which when proved successful, can be emulated by the States. Thus, at the present stage of development, the NEC should have the responsibility and the corresponding capability for high level technical supervision in fields like crop production, horticulture, plantations, animal husbandry etc.* [PARA 4.7]

25. *Once the regional facilities are set up in the region, the NEC Advisers must travel around in the region to see whether and how the facilities are being used, to build up local expertise in the State Governments and advise State Governments as to how best they can use the regional facilities.* [PARA 4.8]

26. *The Planning Commission must try and ensure that there is no overlap or duplication in the NEC Plan and the plans of the individual States. They must also ensure that the development thrusts initiated through the NEC are pursued by the States. In order to do this, the Planning Commission can use the expertise available in the NEC to keep itself informed about local developments. The peripatetic advisers of the NEC can provide the Planning Commission with an effective feed back to moniter the plan. Coordination can be improved if the Planning Commission nominates an officer to liaise with the NEC on a full time basis.* [PARA 4.9]

27. *Permanent rights over settled land are increasingly being recognised and the movement from community to individual ownership has begun. However, the individual needs to be given*

a legal right to the land. The District Councils can play an important role in this since the authority over land tenure is vested in them. State Governments cannot pursue programmes for jhum control without such assistance from District Councils. [PARA 4.19]

28. *A large part of the forest area in the north-east is under the control of District Councils. However, these Councils do not have the technical staff to plan and manage these forests. A certain commonality of approach in silvicultural practices is necessary and, to ensure this, silvicultural control over District Council forests should be allowed to rest with the State Forest Departments.* [PARA 4.20]

V. JHUM CULTIVATION

29. *There are many areas where the jhum cycle is much larger or much shorter than the average. Hence the strategy for jhum control cannot be based on the average figure for a large area, but must take into account the condition in each area.* [PARA 5.7]

30. *There seems to be a discrepancy between picture of land tenure that emerges from discriptions of the tribal society of the region and the data thrown up by the NSS survey. This difference needs to be probed further.* [PARA 5.9]

31. *The evaluation of the pilot project on jhum control programmes in Meghalaya and Arunachal Pradesh have brought out certain important points which need to be taken into account in future programmes. The Committee would draw attention to certain aspects which should also be taken into account in future programmes :—*

(*i*) *With the exception of the pilot schemes of the NEC, the jhum control programmes in the region do not seem to be based on the watershed approach.*

(*ii*) *Though most programmes offer some support in addition to the assistance for land shaping and other land conservation measures, none of the programmes seem to have a truly comprehensive and integrated package of services for the jhumia ;*

(*iii*) *The problem of weeds and pests may well be greater in settled cultivation than in jhum cultivation. The package of practices recommended for jhum agriculture will have to take this into account ;*

(*iv*) *The food needs of the jhumia may not be met by the crops which would be taken up in settled cultivation and some dependence on outside sources for the same items will be there. The answer does not lie in undertaking settled cultivation with the same mix of crops as in jhuming but in a better public distribution system. The cropping pattern will have to be determined on the basis of productivity and economics.*

The Committee also notes that the orientation of the measures taken up is basically towards jhum control i.e., to the conversion of jhum to settled agriculture rather than to jhum improvements. The latter is equally important but practically no work seems to have been done. [PARAS 5.28 AND 5.29]

32. *The strategy for jhum control must distinguish between different areas on the basis of the extent to which the jhum cycle has shortened and ecological problems have arisen. On the basis of field surveys jhum areas should be put into three categories :—*

(*i*) *Areas where the cycle is still above say, 10 years and where ecological problems are not yet acute. In these areas the emphasis should be on improving the productivity of jhum through better agronomic practices and improved varieties ;*

(*ii*) *Areas where the cycle has fallen below say 5 years and where ecological problems are already acute. These areas should be taken up on a priority basis for conversion to settled cultivation within a period of 10 years.*

(*iii*) *Other areas : These areas will probably face acute problems in the near future. Hence, in this case, the immediate measures may be for improving jhum but there should at the same time be a programme for the gradual introduction of settled cultivation. This programme may extend over a period of 20 years.* [PARA 5.30]

33. *Each State/Union Territory should examine the jhum cycle situation in each of its villages and identify the three classes of villages for necessary action. Having done this an annulised programme should be drawn up. The required finance may come from the provisions for jhum control, soil conservation, minor irrigation, IRD, etc.* [PARA 5.31]

34. *Adaptative research on jhum cultivation in different areas as distinct from alternatives to jhuming in terms of settled agriculture is necessary. This particular aspect of agricultural research has not received sufficient attention so far and should be taken up on a priority basis by the ICAR research complex. The ICAR research complex take up such an operations research programme in various sub-regions.* [PARA 5.34]

35. *In areas where settled cultivation is to be promoted, the principal criteria for the selection of a model in any local area must be the extent to which it raises productivity per unit of land and per manday of work. The conversion of Jhum lands to settled cultivations, whatever be the model chosen, must also take account of the nature of the land tenure system. The first problem that has to be tackled is that of giving the Jhumia permanent, heritable and transferable title to some part of the Jhum land.* [PARAS 5.38 AND 5.39]

36. *It is necessary to approach the problem on a community basis. The attempt should be to persuade all house holds in a village to change over to settled cultivation. This can be done through the good office of the village council or the tribal chief. The authority controlling the distribution of land should give individual households permanent heritable and transferable rights over the land brought by them under settled cultivation. The balance of the village lands, which will now no longer be required for cultivation can be converted into community forest under State Government ownership or, if that is not feasible, under the control of the village council. Such community approach will mitiimise the problems involved in moving from the existing system of land tenure to individual ownership.* [PARA 5.40]

37. *It is necessary to provide the required draught power through power tillers and through a suitable re-orientation of the animal husbandry system. The farmers will also have to be trained for ploughing operations by the extension machinery which will have to be strengthened for this purpose.* [PARA 5.41]

38. *The planning of Jhum land conversion must take place on a watershed basis. Watershed management calls for scientific survey and investigation of each watershed by technical team. Since several hundred such investigations will be necessary, it is essential that technical capabilities for this purpose are built up quickly.* [PARA 5.42]

39. *The implementation of Jhum control schemes has to be taken up on a project basis so that all related investments comprising outlays on soil conservation, agriculture extension, input subsidies, infrastructure etc., are covered in the plan. The responsibility for implementation may rest with the project authority even though the technical control may be exercised by the respective technical hierarchies.* [PARA 5.43]

40. *Facilities for adaptive research under varying agroclimatic conditions seem to be lacking. The responsibility for localised adaptive research must be gradually passed on to the State Governments.* [PARA 5.50]

41. *Continuous technical guidance to the farmers will be required. It is, therefore, necessary that an effective extension system with at least one village level worker per village, one extension officer per 8-10 VLWs and suitable complement of subject matter specialists at district and sub-divisional levels be established in all the hill areas of the region. Areawise priorities for strengthening of extension must be laid down on the basis of the proposed development programmes. The extension staff must be in position one year earlier. The Group must be multi-disciplinary as required for the watershed approach.* [PARA 5.52]

42. *The NEC must have a cell for propagating the watershed management approach.* [PARA 5.53]

43. *There must be a smooth movement from pilot schemes, of the sort that have been taken up so far, to demonstration projects and, based on the demonstrations, a training programme for the field level staff of the State Governments.* [PARA 5.53]

VI. HORTICULTURE

44. *A more aggressive programme of horticultural development is required. This will involve not merely paying attention to existing orchards but new developments. Cultivars from other areas in India in similar conditions have to be identified for different parts of the region. Bare areas in forest may also be suitable for intensive horticulture development. Besides new fruits grown in similar conditions elsewhere can also be promoted e.g., chickoo, durain, mangousten.* [PARA 6.13]

45. *Horticultural research has to be aggressive now is the extension of the ICAR's research topographical and climatological conditions indicate that a particular fruit can be grown.* [PARA 6.14]

46. *With regard to citrus, what is required now is the extension of the ICAR's research results to the field. This will require an extension machinery which is effectively linked to the research complex. This link at present stage of development may have to be provided by the NEC which should have a top level citrus expert on its staff, whose job will be to carry over established technologies to the various states where citrus development is possible. The relevant horticultural wings of states will need strengthening.* [PARA 6.15]

47. *It would be desirable if the economics of alternative processing schemes for pineapple are studied carefully by the NEC.* [PARA 6.16]

48. *The extension of horticulture in some parts of the North East will meet with some difficulties of transportation. In remote areas which are difficult of access, it may be possible to pursue the cultivation of nut trees, since in these the problem of deterioration of the fruit in transit dose not arise.* [PARA 6.17]

49. *The foundation of effective horticulture development is the availability of suitable cultivars. It would be useful to undertake a survey of the material that has been distributed to see that has worked. Alongwith the process of identification of suitable cultivars, nurseries should be expanded to meet local demand so as to reduce the need to rely on purchase of planting material of doubtful quality from trade sources.* [PARA 6.18]

50. *Given the required scale of operations the horticulture wing of the Agriculture Department*

will require substantial strengthening in all States. The extension effort will have to cover not merely the provision of planting material and subsidies but also export advice on plant protection and the maintenance of orchards. Moreover, some arrangements for adaptive research and data collection at state level will be necessary to provide a link between the regional facilities like ICAR Research Complex and the extension machinery. [PARA 6.19]

51. *The upgradation of horticulture in this region will have to be accompanied by effective marketing arrangements. What is required is an integrated structure of marketing and processing starting from some arrangements for primary collection (say through cooperatives), processing, storage, and at the apex, an organisation that can undertake marketing outside the region in national and international markets.* [PARA 6.21]

52. *All horticultural growers in the area can be brought within cooperative fold and linked to the processing unit. The possibility of introducing the two or three tier pattern for cooperativisation of growers and linking them with direct or regional level processing and marketing facilities may be worth examining. This may be done by the NEC.* [PARA 6.21]

53. *The processing and storage operations will have to be designed on the basis of the specific requirements of the region. The climate of the region can also be used to advantage by having cool houses for cold storage in the higher altitudes and solar driers for drying fruit.* [PARA 6.22]

54. *The potato crop in this region comes earlier than from anywhere else in India. Thus it has to compete with cold storage potatoes in the early season and has a price advantage. However, this particular aspect of potato marketing needs to be studied in greater detail by the NEC or NERAMAC.* [PARA 6.25]

55. *The Centre's Potato Research Institute must have a station in north-east to develop early season potato for better storage and transport. This extension of area under potato needs to be pursued along with related investments in cold storage and marketing. This latter aspect of processing and marketing can be taken up by the Regional Agricultural Marketing Corporation.* [PARA 6.25]

56. *Ginger production can be stepped up if facilities for preservation and dehydration of ginger are set up.* [PARA 6.26]

57. *Vegetable seed production for national markets may be feasible even in the near future. The National Seeds Corporation should investigate the possibility of seed production in the area for the Indian market.* [PARA 6.27]

58. *Large scale extension of vegetable production will depend entirely on the establishment of effective processing and marketing arrangements. This should be pursued since many of the hill vegetables can be produced in what is the off season in the plains.* [PARA 6.28]

59. *So far we have not been able to utilise fabulous floral wealth for the benefit of the total people. To do this there is a need for a floriculture development centre to undertake extensive surveys to locate plant species of high floriculture value and propagate the selected species for commercial purposes. A joint unit of the Botanical Survey and the ICAR Research Complex should be located in this region.* [PARA 6.30]

VII. PLANTATIONS

60. *The development of plantation crops has been given a special place in the development strategy for the north-eastern region, particularly the hill areas. This is because this area offers great promise for crops like tea, coffee and rubber and also because these tree crops are an ecological sound alternative to jhum cultivation.* [PARA 7.1]

61. *An important constraint on the expansion of plantations is the labour intensive nature of the activity. Plantation development would require the diversion of workers from other agricultural activities. This would be facilitated if plantation development is linked with jhum control. Such an approach is also necessary if local fears that plantations development will lead to large scale immigration are to be removed.* [PARAS 7.16 & 7.17]

62. *The plantation development programme in this region also can be based on the smaller holder approach. Compact areas can be taken up for development by cooperation with each individual family being given the right to about 2 acres. The individual family would have the right of* usufruct *but would not have the right to alienate the land or convert it to some other use. This will require the development of special patta. The processing facilities required would be provided for one or more of these compact areas.* [PARA 7.19]

63. *The District Councils can play an important role in plantation development by organising the extension of plantation area on their lands. They can form cooperatives and can give rights to individuals as has been suggested in the case of corporations.* [PARA 7.23]

64. *Rapid development will require an effective coordination machinery at State level and the responsibility for plantation development must be clearly assigned to a particular department. The approach to plantation development outlined earlier will also require the establishment of a corporation in most cases. In many of the States, this has already been done. In order to support the States the NEC in its organisation should have a technical and managerial group to assist the State Departments*

responsible for plantations as well as the plantation corporations. Coffee, Tea and Rubber Boards should have extension arrangements in the region. [PARA 7.25]

VIII. FORESTRY

65. *The pre-investment survey should identify areas with low stock, medium stock and high stock both within and outside the reserved forests. This is necessary if suitable priorities are to be established on an area-wise basis for the planning of afforestation and exploitation.* [PARA 8.5]

66. *The pattern of ownership of village and district councils forests may be left as at present but silvicultural control may be transferred to the Forest Department. Working plans would be drawn up by the Department and at the time of harvest there would be a sharing of proceeds with the concerned village/district council.* This *approach of course requires a substantial strengthening of forest departments in the region and also an appreciative response from village and district councils.* [PARA 8.12]

67. *The forests under village and district councils control provide fuel and building materials for the local population. Any programme to bring these under the silvicultural control of the forest department will have to be accompanied by a programme of Social Forestry to meet the essential requirements of the local population. In Jhum conversion schemes, the area released from jhuming can be used for this purpose. In other areas the need of the local population will have to be taken into account by the Forest Department in drawing up Working Plans. A similar approach is necessary to meet the fuel wood requirements of urban areas.* [PARA 8.13]

68. *The density of population in some States/Union Territories is very low. This sparseness of population reduces the size of the working force and thus makes the exploitation of forest resources difficult. The NEC should study carefully the experience of the West Bengal Forest Department in the Darjeeling area so as to draw useful lessons for resolving difficulties because of, paucity of labour and transport difficulties.* [PARAS 8.14 & 8.15]

69. *It may be desirable to consider the mechanisation of forestry operations in the north east. Such mechanisation will generate employment opportunities for educated youth and be economical at the relatively high wage rates prevalent in the region.* [PARA 8.16]

70. *The provision of roads for forestry development will have to be limited to definite programmes for exploitation drawn up by the Forest Department, the Forestry Corporation or Forest based industrial units.* [PARA 8.17]

71. *The problem of infrastructural development in forestry can be tackled if the infrastructural requirements are built into the scheme. The scheme should be drawn up in such a way that the cost of infrastructure, whether it be roads or ropeways or skyline crane can be recovered from the sale proceeds. If such commercially oriented schemes are prepared, they can be taken up by the financial institutions as bankable projects. Forestry exploitation plans can also be designed so as to take maximum advantage of the strategic roads which are being built in the remoter parts of the region.* [PARA 8.18]

72. *The approach to forestry development in this region cannot be based merely on the conventional approach which focusses attention on products like timber, plywood, fuel wood and pulping material. There are certain other activities which need to be integrated with forestry development plans. The more important of these are oak tasar culture, the cultivation of fodder trees, horticulture, development and the collection of medicinal plants.* [PARA 8.19]

IX. ANIMAL HUSBANDRY

73. *The starting point for the animal husbandry programmes must be a clear assessment of local requirements of local milk, eggs and meat. This assessment of requirements should be the basis for planning animal husbandry development.* [PARA 9.7]

74. *The availability of breedable bulls from the regional farms is limited. With natural service the number of cows that could be covered would be limited and the cross-breeding target of 4 lakh animals cannot probably be reached. Hence it is necessary that the frozen semen technology is extended as rapidly as is possible.* [PARA 9.12]

75. *The Indian Council of Agricultural Research and the Assam Agricultural University must continue work on the utilisation of local forage crops and fodder trees. The programmes of social forestry and jhum control should include provision for fodder trees and fodder crops respectively.* [PARA 9.13]

76. *The establishment of proper slaughter houses is essential if the meat economy of the region is to develop. Incidentally, a modern slaughter house will also allow the utilisation of by products like eases and blood meal. The latter in particular is very useful for animal food.* [PARA 9.16]

77. *It is particularly important to pursue the programme of cross-breeding of beef cattle as soon as the bulls become available for the proposed exotic beef cattle farms.* [PARA 9.17]

78. *With regard to feed, the fodder, the local grasses and forage trees seem to have great potential. The ICAR has done some work in analysing these. This work should be used to devise appropriate feeding schedules for cattle, using these nutritious grasses and leaves as ingredients.* [PARA 9.18]

79. *There is a large demand for pork in the region and pigs are brought from outside into many of the hill States. At present, much of the spread between the cost of production and market price accrues to the trader who brings in pigs from outside. Piggery development will have to ensure that this income is realised by local farmer. It will also benefit consumers by lowering prices.* [PARA 9.21]

80. *The markets for processed pork must be studied and the required facilities should be built into the main slaughter house.* [PARA 9.23]

81. *The hill areas do not seem to be self-sufficient and pigs are brought in from the plains. One reason could be lack of effective arrangements for procurement of local supplies from rural areas to service urban markets. The shortage of pork and its high price make piggery a particularly attractive proposition. This will require a more rapid extension of exotic breeding and arrangements for processing and marketing.* [PARA 9.24]

82. *The principal problem in the case of poultry is the lack of effective arrangements for the marketing of eggs and broiler meat. Though this has been suggested several times not much progress has been made. The local requirement for eggs may be somewhat limited because of the high levels of meat consumption. Hence any expansion in the pace of poultry development will require more effective marketing arrangements than what obtain at present. The market for eggs and poultry meat requires close study. This may be done by the NEC.* [PARA 9.26]

83. *It is essential that the duckery centre in Tripura is developed and special attention is paid to duckery in the plains.* [PARA 9.28]

84. *In this region the orientation of sheep husbandry may have to be towards meat and wool may be subordinate.* [PARA 9.28]

85. *Goat development and goat breeding by crossing with exotics should also be pursued since goat meat will help to relieve the shortage of meat in the hill areas of the region.* [PARA 9.28]

86. *Despite the very favourable position with regard to livestock availability, the hill areas of the region are not importers of meat. There is clearly some major organisational failure underlying this phenomena. The Committee would suggest that one reason for this failure could be the lack of effective processing and marketing arrangements. As far as milk is concerned, something is being done as part of the Operation Flood Projects. The Committee would suggest that effective arrangements for procurement, processing and marketing of these products is as important as advances in productivity. Hence it would recommend that this matter be examined at a regional level by the NEC who may be asked to prepare a processing and marketing plan for livestock produce.* [PARA 9.30]

X. HANDLOOM AND SERICULTURE

Handlooms

87. *The development of handlooms in the North Eastern Region will have to concentrate on commercialisation of local skills and designs. This would involve identification of a number of products which would have market potential within the region, in the rest of the country and also in the export markets.* [PARA 10.2]

88. *The foundation of any effective programme of handloom development in the region must necessarily lie in a suitable organisational set up. In this report on Village & Cottage Industries, the Committee has suggested a Group Centre approach for servicing clusters of artisans. The same approach is relevant for the development of the handloom sector in the conditions prevailing in the North-East. It should be possible to identify at least 50 such group centres in the different States and Union Territories. Once these are identified, package of measures comprising training, loom modernisation, design and product development and market linkage should be introduced to make each of the group centre viable and self-sustaining.* [PARA 10.3]

89. *For the identification of group centres an important factor to be borne in mind will be the availability of weavers who will be interested in getting themselves trained in the operation of the newly introduced wider width in the looms.* [PARA 10.3]

90. *The replacement of the loin loom by wider width looms may be the basis for the commercialisation of the handloom industry. But this has to be undertaken with a great deal of discretion and caution. Loin looms will continue to be appropriated for serving local markets, and in spite of the handicap of the narrow width of the cloth produced has design advantages. Development Commissioner for Handlooms should take up special projects to find means of commercial exploitation of the loin loom tradition of this region.* [PARAS 10.3 AND 10.4]

91. *Given the constraints of space in the existing households, the common workshed approach is perhaps best suited for the introduction of these new types of looms. In the identified group centres over a period of five years about 50,000 new looms should be introduced in such common worksheds.* [PARA 10.5]

92. *In all the identified group centres, training facilities will have to be set up. The approach should be similar to the training of carpet weavers in different parts of the country successfully taken up from 1975-76. The emphasis of these centres will be on training a sufficient number of master artisans, who in turn train other weavers in the area. Initially the production centres will primarily be training centres where a master artisans would impart training to selected local weavers in the cooperation of the new type of looms and the production of newly developed products.* [PARA 10.6]

93. *The production centres organised on the workshed basis in the group centres would be attached to the already existing state level organisations for purposes of market support. This linkage has to be established from the inception so that these small production centres are not begged down with uncleared production.* [PARA 10.7]

94. *It is necessary to forge links with the existing marketing organisations in the handloom sector for national level marketing of the production. The NEHHDC has already taken steps to open show rooms in the different parts of the country besides warehouses. The Committee would recommend that an important role should be played by All India Handloom Fabrics Marketing Cooperative Society which has a series of well-appointed show rooms all over the country.* [PARA 10.7]

95. *Development Commissioner for Handlooms has already located weavers service centres with design sections at Gauhati, Imphal, and Agartala. These will have to be strengthened particularly with reference to designing and training facilities.* [PARA 10.8]

96. *The Government have already decided to set up an exclusive institute of handloom technology for the North-East which is most likely to be located at Gauhati. This Institute will have to play a very important role and carry out continuous research and development work. Both in regard to training and design development this institute will have to coordinate with the organisations implementing the aforesaid project.* [PARA 10.8]

97. *The distance involved and the difficult nature of the terrain push up the cost of yarn for the North-Eastern weavers. The Commitee recommends that the present transport subsidy scheme should be operated on a much more basis as regards yarn. The various handloom corporations and apex societies already set up in the States together with the NEHHDC will have to play a more active role in the distribution of the year.* [PARA 10.9]

98. *The NEHHDC should act as an overall coordinating agency for the development of the handlooms and handicrafts sector in the North-East. One of the problems of the handloom industry in the North-Eastern Region is the supply of yarn to the handloom weavers. The Corporation could supply the yarn upto the district level in the District Industries Centres. From these, the State's agencies can take out the responsibility for ensuring that yarn reaches the handloom weavers. A process house at Gauhati has been sanctioned, NEHHDC could extend this role to cover more and more processing facilities in different areas according to demand for processing both yarn and cloth.* [PARA 10.10]

99. *As far as marketing is concerned, the State Corporations could concentrate on marketing in their own States while the NEHHDC would concentrate on the All India Market and for the States where such corporations have not been set up.* [PARA 10.10]

100. *The NEHHDC in collaboration with the Regional Institute for Handloom Technology could associate itself with the technical training for weavers and management training for executives at different levels. Other activities of the Corporation would include facilities for warehousing supply of credit and acting as an apex organisation in the region.* [PARA 10.10]

Sericulture

101. *In order to exploit the rich potential that exists for sericulture, it is necessary to chalk out the following programmes of action:*

(i) *Organised castor plantation in specific areas by identifying farmers who are willing to undertake eri plantation and silk worm rearing.*

(ii) *Development of infrastructural facilities by way of getting up grainages for supply of eri silk worm eggs to the eri rears, organising spinning activities on decentralised basis and helping in the marketing of eri yarn.*

(iii) *Upgrading the existing research institution of Central Silk Board for undertaking applied research on eri culture in collaboration with State level Agricultural Institutions.*

The above programme of action is urgently called for as this sector remains untapped and has to be fully exploited for creation of employment and also for utilising the eri silk yarn for clothing needs in this area. [PARA 10.13]

102. *In order to step up production of Muga silk a number of important measures are called for :—*

(i) *Area under muga plantation should be substantially increased to make available the host plant for rearing activities.*

(ii) *Muga plantation which is undertaken in the forest areas should be developed on economic scale of plantation as has been done in the case of tropical arjun plantation so that rearing activities are facilitated.*

(iii) *A package of incentives should be provided to the muga rearers and a scheme on the lines of the Inter-State Tasar Project for increasing muga silk production should be implemented by Central Silk Board under the Centrally Sponsored Schemes.*

(iv) *Activities for the raw material bank for muga raw silk opened recently by Central Silk Board should be stepped up and arrangement should be made to ensure that the procurement of cocoons is directly from the rearers themselves and not from the middleman dealers. Further muga cocoons should be treated as minorforest produce and fair price should be assured to the rearers. Since muga rearers are part of the tribal community*

in the area, tribal development plan programmes should include specific projects for muga development. [PARA 10.16]

103. *The crucial elements in the strategy for the development of mulberry culture therefore have to be the rearing of high silk yielding variety of silk worm race and improvement of leaf yields by extension of high yielding varieties and appropriate agronomic practices. The Committee suggests the following :—*

(i) *It should be examined that as to what are the varieties of mulberry which will grow profitably in this area and help in the process of increasing mulberry silk industry in this region.*

(ii) *Detailed trials of several varieties of silk worm, mono, bi and multivoltine should be tested out to find a suitable economic mix of varieties which can give three or four raisings a year.*

(iii) *In order to popularise mulberry sericulture 10 pilot extension centres should be set up by Central Silk Board in this region.*

(iv) *Nucleus grainages of Central Silk Board should be established for production of seed cocoons and supply of commercial eggs to the rearers. As a subsequent measure the State Governments should be helped to set up grainages for production of commercial layings.*

(v) *As far as possible even from the begining the improved techniques of the rearing of mulberry worm successfully adopted in Karanataka, Andhra Pradesh and Tamil Nadu should be introduced in this Region also.*

(vi) *Arrangements for marketing of cocoons reeling of cocoons and supply of raw silk to the weaving centres should be undertaken* [PARAS 10.17&10.18]

104. *With regard to oak tasar, the Committee recommends that oak plantation should form part of the forestry programme in this region and extension facilities should be provided to increase the area under oak plantation.* [PARA 10.22]

105. *In Oak tasar culture, production of seed cocoons is inadequate due to low effective rate of rearing and high sex-ratio for preparation of commercial layings. Most cocoons produced are used for laying preparation. For preparation of layings, seed cocoons are subjected to a period of artificial hibernation i.e., preservation in cool environment. A more precise and efficient method i.e. preservation of the seed cocoons in cold storage should be adopted. The problem of irregular emergence can be solved to a large extent by finding out the required temperature for seed preservation. Supply of seed cocoons can be increased considerably when optimum conditions for their preservation are established.* [PARA 10.23]

106. *Oak tasar worm shows a tendency of continuous degeneration affecting the vigour of the worm as well as fertility. Pure parent stocks of A. pernyi and A. reylei need to be maintained in large numbers, so that fresh hybrids can be obtained every year. The rearing of parent stocks can be intensified at the Parent Stock stations of Meghalaya and Manipur. Stocks of hybrids can be reared in controlled rearing houses to prevent degeneration.* [PARA 10.24]

107. *Standardisation of reeling and boiling processes is essential in order to achieve a production of uniform and quality reeled yarn.* [PARA 10.26]

XI. INDUSTRY AND MINERALS

108. *From the point of view of medium and large industry the most promising resources are the forest wealth of the region and the substantial deposits of oil, coal and limestone. The development of horticulture and plantations can assist in the growth of small and medium agro-based industries. The growth of sericulture and the demand for yarn in the handloom sector provide a base for the development of textile industries. These along with a variety of small units for serving local consumption demands can provide the basis for a more rapid industrialisation of the area.* [PARA 11.4]

109. *Given the difficulty in attracting manpower from outside and the lack of a sufficient number of adequately trained local persons, it may take decades to survey the resources of the area fully. It may be desirable to follow a slightly different approach in which, in the first instance, a large part of the region is covered by first approximation surveys. Thereafter promising areas could be identified and priorities set for the more detailed ground based surveys. Detailed investigations can be taken up when the prospect for the exploitation of a surveyed deposit seems sufficiently.* [PARA 11.9]

110. *There are possibilities for developing industries based essentially on local markets. The identification of these would have to be based on a careful survey of the present level of demand for manufactured consumer goods and intermediate goods in the region. The Committee is not aware of any such systematic study in this area. It would recommend that the NEC undertake such a study of the local demand for manufactured goods, the manner in which this is being met, the extent to which the local demand can be met by local units, the types of units, that can be set up for this purpose, the optimum scale and investment for such units etc.* [PARA 11.10]

111. *Action plans have been prepared by several DICs. These Action Plans also identify a certain number of industries for which there is, on the face of it, a potential for development. These reports can provide a starting point for more detailed feasibility reports which should try and establish the feasibility and viability*

of the proposals and provide the basis for a bankable proposition. The feasibility reports may be commissioned by the promotional agencies of the State Governments like the Department of Industries and the Industrial Development Corporation. [PARA 11.11]

112. *In its Report on Industrial Dispersal and on Industrial Organisation, the Committee has recommended a three-tier structure for entrepreneurial development, the first tier being provided by DIC, the second by the State level promotional agencies and the third by a regional centre to be set up by the IDBI. In the north-east the dependence on the third tier may be quite substantial. Hence, the Committee would recommend that the IDBI should set up a regional entrepreneurship development centre in the north-east. Apart from actual training, this centre should also provide guidance to other 'EDP' programmes by undertaking periodic evaluation of these programmes. The NEC can also play an important role in this task in several ways. Firstly, it can strengthen the expertise available within the region by organising training programmes for the staff of the State and District level industrial promotion organisations. Secondly, it can help the States in getting expertise from outside whenever it is required. Thirdly, it can assist the States in arranging for suitable exposure to working enterprises both within and outside the north-east region for the entrepreneurial trainees.* [PARA 11.14]

113. *The development of entrepreneurship as well as the need for technical support during the construction and operation stage will require an effective institutional system. One possible approach would be to exchange personnel between the institutions in the north-east and their successful counterparts elsewhere in the country. The expert from elsewhere in the country would work in the north-east while the officer from the north-east works in the counterpart institution to gain the necessary experience. After a fixed period of, say two years, the expert on deputation can revert back and the officer from the north-east can return. Such an arrangement could help in building up the talent in local personnel. The NEC and the DC (SSI) would have to accept responsibility for such a programme.* [PARA 11.15]

114. *In the north-east the need for exploiting local demand fully for purposes of industrial development is very great. Hence the DC (SSI) would have to pay particular regard to implement its responsibilities for ancilliarisation in an effective manner in this region. It must also take the lead in ensuring that the demands arising from Central Government Organisations in the region are also met to the greatest extent possible by local industry.* [PARA 11.16]

115. *The uncertainties in the supply of raw materials from outside the region would have to be reduced firstly by the extension of the national distribution network of major suppliers like STC and SAIL in the region and secondly by a more vigorous policy of raw material support by State Governments.* [PARA 11.18]

XII. TRANSPORT AND POWER

116. *With regard to rail development the most important gap seems to be the limited capacity available to service the areas south of the Mikir Hills. A linkage with the rest of the country via the Brahmaputra Valley is essential. This would require that the entire section from Gauhati to Lumding and Southward would have to be upgraded and its capacity increased. Already its capacity is below requirements and will be even more so once the new lines into Manipur, Tripura and Mizoram become operational. The Committee would suggest that the proposals in this regard and other proposals for rail development in the region may be examined sympathetically keeping in mind the relaxation of investment criteria suggested by the National Transport Policy Committee.* [PARA 12.8]

117. *With regard to road development at present stage further development in the north eastern region would have to be based on the specific needs of each project and programme. Moreover, given the large gap in requirements, every attempt must be made to locate projects and programmes in manner that minimise the need for additional infrastructure. Thus market oriented horticulture can be developed fast in areas clearly served by roads. Forest based industries can be located in forest areas which can be readily opened for exploitation. The resource available for road works may be stretched further if the standards of road construction are re-examined, in the light of area needs so as to identify economics in construction costs.* [PARA 12.14]

118. *There will be areas where new opportunities have been identified and can be promoted if road transport is provided. The roads required for such purposes should be given priority in the general road development programme of the States, NEC and the Centre.* [PARA 12.15]

119. *There is a programme for the construction of strategic roads and roads required for administrative purposes. The compulsions with regard to routes and alignments differ in these cases from development roads. However, there will be many cases where such administrative and strategic roads will help to exploit potential for development.* [PARA 12.15]

120. *One possibility for extending the road network is to include road development as part of a productive scheme. A commercial forestry scheme can include the required road development within the forest area. These roads can be used for other purposes. A similar approach may be possible in other sectors e.g. plantation.* [PARA 12.15]

121. *The developments in horticulture plantations and other sectors would be difficult unless trucking services are available even in the interior. Special measures to promote road*

transport operations may be taken. This could take the form of concessional loans for freight transport operations or the extension of freight services. [PARA 12.16]

122. *The possibility of taking up water transport in some of the tributaries of the Brahmaputra has been identified and areas of potential have been identified. Further development of IWT in this region would relieve the pressure on the rail and road system and needs to be pursued.* [PARA 12.17]

123. *The NEC has identified several areas where ropeways schemes could be taken up. These alternative modes of transport can help to meet requirements for large industrial or mining projects and would have to be considered mainly in the context of such developments.* [PARA 12.18]

124. *A comprehensive and integrated area transport plan should be prepared for the region by the Planning Commission and the NEC. The progress of implementation of the area transport plan should be monitored by the Planning Commission.* [PARA 12.19]

125. *With regard to the immense hydel potential of the region, what is required at this stage is detailed investigations and project preparations which, given the size of the projects, will naturally be a Central responsibility.* [PARA 12.23]

126. *The extension of electricity to rural areas can play an important role in lift irrigation and in decentralised agro-processing. Hence the pace of rural electrification needs to be stepped up from the point of view of local development. REC's lendings in the north-eastern region should be placed in the lowest category* i.e. *the category with the easiest terms of lending.* [PARA 12.24]

127. *It is essential that the micro hydel potential in the remote hill areas of the north-east is investigated and if found to be feasible and economical, a shelf of such schemes is prepared. Schemes should be taken up on a priority basis where there are possibilities of agro-processing and primary processing of forest produce. The REC should support such viable micro hydel schemes.* [PARA 12.25]


सत्यमेव जयते

1. INTRODUCTION

The terms of reference of the National Committee on the Development of Backward Areas require it to examine the validity of the various concepts of backwardness underlying the definitions in use for present policy purposes, to recommend the criteria by which backward areas should be identified and to suggest appropriate strategies for effectively tackling the problems of backward areas.

1.2 The National Committee's approach to backwardness is based on the concept of 'fundamental backwardness' in which areas are categorised as backward on the basis of the prevalence of some fundamental inhibiting factor which can be countered only by making special efforts for development and often by making significant departures from national strategy. The Committee has indentified six types of fundamentally backward areas viz :

(i) Area of tribal concentration

(ii) Hill areas

(iii) Drought pronc arcas

(iv) Hot and cold deserts

(v) Chronically flood affected areas

(vi) Coastal areas affected by salinity.

Besides this the Committee has dealt with the problem of industrial dispersal for which purpose it has defined industrially backward areas as those that lie beyond certain specified out off distances from existing industrial centres.

1.3 The North Eastern region, comprising of the States of Assam, Manipur, Meghalaya, Nagaland, and Tripura and the Union Territories of Arunachal Pradesh and Mizoram, does not, fall into a separate category of backwardness. Much of the region will be covered under one or the other category of fundamental backwardness. Specifically three types of fundamental backwardness are found in the region viz. areas of tribal concentration, hill areas and chronically flood affected areas. As far as industrial backwardness goes, the whole of the north-east has been categorised as industrially backward by the National Committee as presented in the Report on Industrial Dispersal. Since the Committee has dealt with the appropriate strategy of development for each type of fundamental backwardness in separate reports and with the problem of industrially backwardness in the Report on Industrial Dispersal, the problems of the north east have been covered in these reports. The Planning Commission desired that the National Committee should give a separate report on the north east since this area represents a complex of conditions and problems which have to be examined in a unified way. Many of the recommendations made in this report echo the recommendations made in other reports of the National Committee, however, in this report they are presented as they arise from the developmental problems of the north east as a region.

1.4 Whilst accepting this task the National Committee was aware of the many difficulties in giving an authoritative overview. The National Committee has as its members people with deep administrative knowledge and extensive experience at the field level, however, as far as the North-East is concerned the Committee members have a very limited knowledge of local conditions with regard to administration and development problems.

1.5 At an early stage in its work the Committee decided to investigate at the field level the problems posed before it at field level to gain detailed understanding. This was for updating their knowledge and also to understand the several problems which have arisen in the process of development. Hence the Committee members visited selected villages and blocks in different types of areas and had discussions with the development administration at all levels. The Committee also held discussion with several State Governments. In order to provide some depth to its analysis the Committee arranged for a series of seminars on different types of backward areas. It was only after this elaborate study that the Committee ventured to make certain suggestions. However, in the case of North-East the Committee has not been able to do this because of the disturbed conditions in the area. Field level investigation by the Committee members was not possible. The seminar on development problems of the North East was scheduled but could not be held, once again, because of disturbed conditions in the area. However, the papers prepared for the seminar

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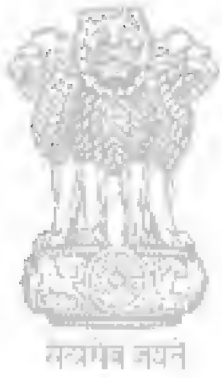
have beeen used by the Committee to gain some understanding.

1.6 Thus the Committee suffers from great disabilities in giving recommendations on the development problems of the North-East. It has relied largely on readily available published material and the material available with the Planning Commission and the North Eastern Council. Hence the report of the Committee is tentative and further detailed studies will be required to firm up the recommendations. The terms of reference of the Committee required us to examine ongoing programmes. For the North-East recommendations are broadbased taking a broad view of resources and skills available in the area and the present state of administration. These broad recommendations will have to be refined. This limitation must be understood in firming up plans and programme for different areas in the North-East region.

1.7 The report begins with a brief description of the special features of the north eastern region and outlines its development problems. This is followed by a chapter on administrative arrangements and the constitutional provisions after which there is a series of chapter dealing with problems in specific sector.



2. CHARACTERISTIC FEATURES OF THE REGION

Physical Features

The North Eastern Region comprising the States of Assam, Meghalaya, Manipur, Nagaland and Tripura and the Union Territories of Arunachal Pradesh and Mizoram have an areas of 2.55 lakh sq. kms. which constitute about 7.7 per cent of the total land area, of the country. This large region situated at one corner of the country is linked to the rest of the country through a narrow belt of Bengal. It is a sensitive border area surrounded by China on the north, Burma on the east, and Bangladesh on the south (of Assam and Meghalaya) and west (of Tripura and Mizoram).

2.2 Physically the region consists of four distinct geographical areas :—

(i) **The Brahmputra Valley.**—This valley which lies entirely in Assam vanes in width from 80-100 Km. in Upper Assam to about 55 Kms. in the middle, near the Mikir Hills. On the North bank of the river terai or semi-terai conditions prevail because of the innumerable tributaries. The tributaries on the south side are much larger. A significant physical characteristic of the Brahmputra is that the river due to its low gradient is highly braided and there are innumerable riverine islands.

(ii) **Eastern Himalaya.**—These are the eastern most part of the Himalayas and lie within Arunachal Pradesh and are distinct from the other mountainous areas in the region.

(iii) **Eastern Mountain Region.**—This region covers parts of Arunachal Pradesh (on Tirap and Lohit districts), Assam and all of Nagaland, Tripura, Manipur and Mizoram. The whole of region is dissected by numerous rivers and their tributaries. These rivers are typical mountain streams flowing between high rocky mountains with the channel confined to narrow valley. Most of the inhabited areas lie either in these valleys or valley slopes. The important low-lying areas in this region are the Tripura-Cachar Plain and the Imphal Valley.

(iv) **The Meghalaya Mikir Tableland.**—This covers the outlying Mikir hills and Garo Khasi and Jaintia hills in Meghalaya. Geologically this region is an extension of the Indian Peninsular shield.

2.3 The north-eastern region does not have any common physical characteristic and all types of physical formations from alluvial plains to table lands, mountain and valleys, low hills and high mountains can be found here. The one common consequence of the physical features is the difficulty in establishing communication links between different parts of the region which are cut off from each other by mountains and rivers.

Climate

2.4 There are distinct climate variations in the North Eastern region. The Assam Valley has an opening to the West and is surrounded on other sides by mountains and plateaus. The lofty ranges in the north protect the valley from the cold air mass of the Tibetan region and provides conditions for concentration of rain as they obstruct the warm south west monsoon. The mountaineous zones enjoy a typical monsoonal climate with variations from the tropical to temperate. The rapid changes in topography result in climatic changes within short distances.

2.5 The amount of total annual rainfall in the region varies from a minimum of 800 mm to a maximum of over 3,000 mm. The north western part of the Mizo Hills along with the adjoining areas of Cachar and Manipur receive less than 1500 mm. Tripura, rest of the Mizo Hills, Cachar and the western half of Manipur Hills receive between 1500-2000 mm. There is a great deal of local variation depending on topographical features. For example, the hill slopes facing southwest always receive more rainfall than the enclosed valleys. These localised variations in rainfall have to be taken into account in agricultural planning.

2.6 Winter temperatures in the region vary a great deal. In the Assam Valley winter temperatures remain about 12-13°C. In the Himalayan zones, winters are cold and damp and minimum temperatures are between 0-2°C in the south coming down to below freezing point in the north. Winter rains are also a regular features in the area. In the eastern mountains zone, winter temperatures fall steeply but not as much as in the Himalayan zone. However, winter is generally a dry period in this area.

Population

2.7 According to the 1971 Census the north-eastern region had a population of 19.06 millions of which 14.6 millions was in Assam and the balance 5 million in the remaining six constituent units. The 1981 Census has not been conducted in Assam as of date. Hence the only figures that are available at present for that state are in the nature of projections. On this the population of the region as of March, 1981 was 26.6 million of which the projected share of Assam was 19.9 million and of the other constituent units 6.7 million. The figures

for the individual units other than Assam are as follows :

	Population 1981 (000)
Arunachal Pradesh	628
Manipur	1434
Meghalaya	1328
Mizoram	488
Nagaland	773
Tripura	2069

Since complete data for 1981 are not available much of the analysis that follows is based on the 1971 Census data.

2.8 The first and most marked characteristic of his region is the low density of population in all areas other than Assam and Tripura. Figures for the different constituent units being as follows :

TABLE 2.1

Population Densities

State/Union Territory	Density Persons/Sq. Km. of land area	
	1971	1981
1. Arunachal Pradesh	6	7
2. Assam.	186	254*
3. Manipur	48	64
4. Meghalaya	45	59
5. Mizoram	16	23
6. Nagaland	31	47
7. Tripura	149	196
8. All India	177	221

*Projected.

2.9 The very low densities in many parts of the region are attributable to the nature of the terrain. A comparison with arable land is difficult as reliable data are not available. The forest area is vast and the precise nature of the areas classified as barren and uncultivable is not very clear. A rough comparison with available data suggests that population densities would remain substantially below the national average even if a comparison with arable land is made in Arunachal Pradesh, Meghalaya and Mizoram. It may be noted that densities are low despite extensive immigration.

2.10 The low density of population is also reflected in the low population per village in the hill areas, the average ranging from 151 per village in Arunachal Pradesh to 481 per village in Nagaland as against the national average of 762 per village in 1971. The average for Mizoram is higher but this may be on account of the difficulty in defining the concept of a village in that region. The average in the Assam Plain is 641. In many parts of the north-east, villages are administrative creations and do not reflect the scattered settlement pattern.

2.11 The second marked characteristic of the population of this region is its rapid rate of growth. The relevant figures are in Annexure 2.1. The figures for 1961-71 and 1971-81 are as follows:—

TABLE 2.2

Population Growth

States/Union Territory	Population Growth (Percentage)	
	1961—71	1971—81
1. Arunachal Pradesh	38·91	34·34
2. Assam.	34·95	36·09*
3. Manipur	37·53	33·65
4. Meghalaya	31·50	31·25
5. Mizoram	24·93	47·75
6. Nagaland	39·88	49·73
7. Tripura	36·28	32·37
8. All India	24·80	24·75

*Projected.

It will be seen that the growth in population in this region has tended to be substantially higher than the national average. The data on birth and death rates available for the seventies does not show any significantly higher rate of natural increase. If this is true for the earlier period also then the rapidity of the increase must be due to extensive immigration. The major population movements in recent times in the region have been the following*:—

— movement of the peasantry of East Bengal into Tripura and Brahmaputra Valley (18th Centry onwards)

— movement of the tribal population of North Bengal and South Bihar into the tea plantation of Upper Assam (Largely late 19th and 20th centuries).

— movement of Nepali and lately, Bihari cowherds in Assam and Meghalaya.

— movement of tribals from other countries particularly in border States.

2.12 The third important characteristic of the population of this area is the high proportions of Scheduled Tribes, the relevant figures being as follows :

State/Union Territory	Percentage of Scheduled Tribes to total population in 1971
1. Arunachal Pradesh	79·8
2. Assam	11·0
3. Manipur	31·1
4. Meghalaya	80·4
5. Mizoram	94·3
6. Nagaland	88·8
7. Tripura	29·0
8. All India	6·9
	7·5**

*Based on "Geo-ecological background to developmental activities in the North-East" by Dr. G. S. Aurora : Paper prepared for Seminar on Developmental Problems of the North-East in Historical Perspective.

**After revision as per Constitution SC/St Order (Amendment Act) 1976.

As these figures show four out of the seven constituent units are essentially tribal in character. In two of them, Manipur and Tripura, the percentage of tribal population is about four times the national average and even in Assam it is more than one and-a-half times the national average.

Socio-Cultural Features

2.13 The North Eastern Region has certain special socio-cultural features which need to be taken into account in development plans. The high percentage of tribals in the total population has been referred to earlier. The number of Scheduled Tribes identified (excluding sub-groups) in the different states is also very large, the relevant figures being as follows : .

1. Arunchal Pradesh	110
2. Assam, Meghalaya, Mizoram	
(a) in the autonomous districts .	14
(b) in tribal areas other than autonomous districts. . . .	11
(c) in the State of Assam excluding tribal areas	9
3. Manipur	15
4. Nagaland	39
5. Tripura	19

Considering the fact that the total tribal population of the area is only 4.35 million it is clear that there are a large number of relatively small tribes. Many of the tribes cut across not merely state boundaries, but also international boundaries. Thus, there is a great deal of heterogeneity of population within the area. The tribal areas do not of course face the multi-caste problems which may be found in other parts of India since there is a great deal of equality within the tribals. But even here, the distinction between the ruling families and the others as well as the existence, in the past, of slavery in some cases has to be noted. Nevertheless, on balance group conflicts within communities may not be a major problem. What is probably more important is the possibility of conflict between tribals with respect to land rights etc. which may be more prevalent because of the very large number of tribes in the areas.

2.14 The tribals communities of the N. E. differ in significant way from the tribal communities in the rest of India. They are educationally more advanced. For example, the literacy rate of scheduled tribes in the North East relative to the position in India is as follows :

TABLE 2·3

The Rates of Literacy of Scheduled Tribes, 1971

	Males	Females
Assam	34·62	17·16
Arunachal Pradesh . .	8·72	1·70
Manipur . . .	38·64	18·87
Meghalaya . . .	30·11	22·79
Mizoram . . .	(Included in Assam)	
Nagaland . . .	30·17	17·68
Tripura	23·60	6·04
All India . . .	17·63	4·85

As this table shows the rates of literacy amongst the tribal population in this region are higher than the all-India average for tribals except in Arunachal Pradesh. The ability of the tribal community to benefit from the job opportunities generated through development process is substantially greater in the north-east than in the other tribal areas. There is a stock of educated youth who, if trained, can take-up positions in development, administration, industrial projects etc.

2.15 The tribal societies of the N. E. have lived in relative isolation for a very long period of time and many of the traditional attitudes of tribal communities are still prevalent there. An important instance of this could be the non-competitiveness of the tribal society where each person has a certain way of living and a standard of life which he cannot change at the expense of other members in the group. Production for self-consumption and subsistence is the basis for economic activity and calculations based on market values are seldom the basis for decisions on what and how to produce. In this situation when the system is opened to market forces the local tribals, even though they may be well educated, may not in fact benefit.

2.16. A substantial proportion of the non-agricultural enterprises in hill and tribal areas, particularly in the towns, are controlled by non-tribals. The nominal ownership may well rest with a tribal, if nothing else because of the exemption from income-tax that this would entail. But the bulk of the profits would accrue to the real owner. This situation obtains not merely in industry but also in trade, transport operations and other services. One reason for this is the inability of tribal entrepreneur to cope with the superior business acumen and enterprise of the non-tribal. The educated tribal, who could perhaps enter these areas of self-employment tends at present to prefer the more secure avenues of salaried employment open to him. Thus, the processes of non-agricultural development generated in this area do not always benefit the tribal except in the limited area of government employment.

2.17 The growth of the market economy in these areas has progressed very much and many communities who lived by barter have been exposed to the cash nexus. Since the trading intermediaries in this market economy are often non-tribals, there is a social gulf between the trader and the customer which opens up possibilities of exploitation. In many ways the impact of the opening up of the economy to market forces is very similar to what was observed in other parts of the country in the nineteen century. Traditional crafts are under pressure as the cost of factory made articles is less. Indebtedness to money-lenders increases as the cash requirements of the household rise with the decline in traditional crafts and a shift away from subsistence cultivation. The situation of course, varies greatly from one tribal groups to

another. There are some tribal groups which have had long tradition of contact with the market economy and they are in a better position to cope with the opening up of their economies. There are, however, many other groups which have lived a more isolated existence who may well lose out if they are exposed to uncontrolled market forces. These variations in the ability of different tribal communities to cope with a new economy have to be taken into account in any development strategy.

2.18 Some of the tribal groups in this region have a matriarchal system of inheritance. There are many versions of this. But broadly speaking, they involve the passing of all property through the female branch. However, the effective management of these properties does not always rest with the women, though the high participation rates of women in the work force are high. In such cases it is possible that the men who work the property may not have a sufficient incentive to undertake improvements and innovations. This is not a matter on which one can give any firm opinion. It is only a hypothesis which needs to be tested.

2.19 In sum the two key socio-cultural features that need to be taken into account in any development strategy are the fragmentation of tribals into a large number of small groups and the inability of some of these groups to complete on equal terms in the market economy. Besides this the land tenure system in the area has certain special features which are dealt with later in this chapter in paras 2.35 to 2.42.

Labour Force

2.20 The labour situation in the north-eastern region is substantially different from what it is in most other parts of India. According to the Sixth Five Year Plan the daily status employment rates in the north-east in 1977-78 were as follows :

	Employment rate by daily status
Arunachal Pradesh	0·35
Assam	1·81
Manipur	2·00
Meghalaya	0·41
Mizoram	n.a.
Nagalanad	1·03
Tripura	5·04
All India	8·18

As this shows the problem of under employment and un-employment is not of any great significance except perhaps in Tripura.

2.21 The second distinctive characteristic of the labour force in the region is the high participation rates of women in the labour force in the hill states. The relevant figures for the 1971 Census are as follows :—

TABLE 2.4

Participation Rates, 1971

	Workers as percentage of corresponding Population	
State	Males	Females
Arunachal Pradesh	63·1	51·3
Assam	48·8	4·7
Manipur	45·3	23·6
Meghalaya	53·2	34·6
Mizoram	51·4	39·5
Nagaland	55·6	45·2
Tripura	49·4	4·8
All India	52·5	11·9

2.23 The high participation rates and the low rates of unemployment mean that there is very little employment slack to be taken up in the hill states. Because of this it has not always been possible to find labour for construction work in the region even at relatively high wages. But it may be noted that this may also be due to some extent to lack of organisation for mobilising labour.

2.24 The position with regard to the educated unemployed cannot be assessed with any firm data. However, in order to indicate a broad picture we present below some date on the ratio of job seekers on the live register of employment exchanges to the enrolment in the relevant stage of education. Job-seekers above matriculate but below graduate level are compared with enrolment in secondary schools and job-seekers who are graduates and above with enrolment in collges/universities. The relevant figures are as follows :

TABLE 2.5

Educated Unemployment, 1977

	Job Seekers as % of enrolment in relevant stage	
	Matriculates	Graduates
1. Arunachal Pradesh	n.a.	n.a.
2. Assam	39·2	14·2
3. Manipur	104·5	34·1
4. Maghalaya	16·0	9·5
5. Mizoram	11·9	7·1
6. Nagaland	3·7	3·6
7. Tripura	111·3	65·2
8. All India	45·5	29·1

The data in this table suggest that the situation with regard to the incidence of unemployment amongst the educated is distinctly better than the national average in Meghalaya, Mizoram and Nagaland. Though relevant data for Arunachal Pradesh are not available, the situation

there may be similar. In Assam the position appears to be somewhat better than the national average but not to as great an extent as in the predominantly tribal hill states. However, the data suggests that in Manipur and Tripura the problem of educated unemployment may be distinctly worse than the national average.

2.25 The description of the labour force and the employment situation brings out one important point. Development plans in the hill areas of the north-east cannot be based on the assumption of an employment slack and the alternative employment generated by new developments in horticulture, plantations, animal husbandry, etc. must offer fairly high wages or returns per manday if they are to succeed. The possibility of shortage of candidates for technical and non-technical posts in development administration and in projects must also be kept in mind.

Natural Resources

2.26 The north-eastern region has a rich natural resources base for agricultural and industrial development. The problems of development lie not in the lack of natural resources but in the large investments required for infrastructure development, the inadequacy of labour and the necessary skill needing an extensive programme of manpower development.

2.27 The land area of the region is vast in relation to the population. However, much of this land is not usable for cultivation. Precise figures on the availability of cultivable land are not available for the entire region but as indicated earlier, rough comparison suggest that it is much above the national average at least in Arunachal Pradesh, Meghalaya and Mizoram. Much of the land available for cultivation is in hill areas, where substantial investments would be required, if cultivation practices are to be modernised.

2.28 With regard to forest resources the region is well endowed. The total area under forests in the region is around 1.25 lakh sq. km. as indicated by the NEC, which is nearly half the geographical area. This is roughly 17 per cent of the forest area of the country. The forest types in the mountains range from tropical evergreen in the foothills, to temperate evergreen in the middle ranges to conferous in higher elevations. There are also vast tropical and deciduous forest areas in the plains. In terms of varieties, the region is rich in Sal, Teak, Bamboos and many trees of high economic value.

2.29 Some data on the mineral resources of the region are given in Annexure 2.2. The most important mineral resource lies in the oil reserves. Nearly one-quarter of the recoverable reserves of crude oil and natural gas in the country lie in Assam. There are also promising finds in other parts of the region. The region is also well endowed with coal in the Upper Assam region and adjacent areas in Nagaland and Arunachal Pradesh and in the Meghalaya plateau. The hydel potential of the region is vast and amounts to around a quarter of the national total. There are large reserves of lime stone, much of it in close proximity to the coal reserves. Apart from these there are substantial reserves of clay and glass sand.

2.30 Thus, in terms of natural reserves the region is exceptionally well-endowed and in most items the availability in relation to population is well in excess of what can be found in other parts of the country.

Agriculture

2.31 The north-east is basically an agricultural society. At the all India level the percentage of workers in agriculture and allied sectors was around 72 per cent in the 1971 Census. In the north-east the percentage is high in all States/UTs other than Manipur, the average for the region being 77 per cent.

2.32 The hilly terrain of the north-eastern region and the pattern of land availability has led to two distinct systems of agricultures (i) settled agriculture in the plains, valleys and gentler slopes and (ii) jhum (slash and burn) cultivation elsewhere. In jhum cultivation a plot of ground is cleared for cultivation, used for one year and then left fallow. In the following year another plot of ground is tilled and so on till after a number of years the cultivation cycle returns to the first plot. Typically jhum cultivation is practised by hill tribals.

2.33 The problem of jhum cultivation is found in many hill and tribal areas of the country. However, the severity of the problem is much greater in the north-eastern region. It has been estimated that around 27 lakh hectares are subject to jhuming in the north-eastern region of which around 4.5 lakh hectares is sown at any one point of time. This may be compared with the total not sown area of around 33 lakh hectares. The problem is even worse if we exclude areas of settled cultivation like Assam and Tripura. If this is done the area subject to jhuming is around 19.8 lakh hectare, the area sown at one point of time 3.6 lakh hectares and the corresponding net area sown around 6.2 lakh hectares. Thus outside Assam and Tripura more than half the net area sown may consist of jhum plots.

2.34 Jhum cultivation is generally conducted without the use of a plough and with the use of the primitive implements. Since the system is subsistance oriented, mixed cropping is common and irrigation is naturally non-existent. Such a system may have been viable at the time when population was stable but with growing population the jhum cycle shortens and natural processes of regeneration are cut short. This leads to a loss of soil and erosion and declining fertility.

Land Tenure and Cultivation

2.35 The system of land tenure and local government in North-East has certain special features which arise to a large extent from prevailing agricultural practices. There are many variations amongst the different communities and the description that follows is based upon papers prepared for the proposed seminar on the Development problems of the North-East. These papers covered the following tribal communities: Dimasa Cacharis, Adio, Mizos, Karbis, Apa Tanis, Ao Nagas, Noctes, Caros and Wanchos.

2.36 In most of the hilly regions of the north-east the prevailing method of cultivation of **jhuming** i.e. slash and burn cultivation. In this system a certain area of jungle is cleared, the debris burnt and the crops grown for one season on the cleared soil. In the next season and for some years there after jhumed area is left and another area is cleared and used for cultivation. In due course, after say 10-15 years the jhumias return to the first post and one jhum cycle is complete and the second one starts. With this method cultivator shifts from area to area and does not till one plot of land continuously. Hence individual rights to a piece of land cannot get established.

2.37 The general practice in jhum areas is that each village has a well-defined range of operation in which the jhum cycle as well as other activity like hunting and wood cutting are confined. Within this area land is allotted to each household on the basis of its capacity or its need, by a village level authority like a village council or a chief, guided by village elders. However, thereafter the land so allotted is not cultivated jointly but separately by each household, though in some cases, operations like land cleaning are undertaken jointly. The location of the settlement itself may change over the jhum cycle.

2.38 The village council's generally involve all household heads on an equal footing. However, there is often a distinction between the village elders and the other household heads. The powers of privileges of the chief or the headman vary from case to case.

2.39 Since the areas within which the village carries on the jhum cycle has to be defined and inter-village territorial disputes resolved there is often an arrangement for a supra-village authority institutionalised in the form of a kingship or a council. Thus many of the tribal areas have a traditional political institution at areas level.

2.40 The close connection between jhum cultivation and communal control over land and ownership is attested to by the fact that at least for the tribal groups like the Dimasa, Cacharis such communal ownership does not apply to settled lands under wet or dry cultivation even in jhum villages. These are generally held under individual ownership. The point is further corroborated by the case of the Apa Tanis of Arunachal Pradesh who have settled valley agricultural with individual ownership.

2.41 Apart from village lands and lands under individual ownership in certain cases there are clan lands used for the land tenure system in jhum area characterised by communal ownership but operational management is done separately by households. Jhum cultivation, particularly in the land cleaning stage requires a great deal of labour. At the same time the predominent household farm seems to be nuclear and arrangements akin to the joint family system seem to be rare. The main reason for this is that laws of decent and inheritence seem to inhibit the formation of household. For example, in the case of parmogentive is common and therefore children not in the line descent from separate household. However, with assistance from the parent household if necessary these separate households also become cultivators in their own right. Thus the dominant pattern is that of smaller households with a one or two able bodied adult males. This system when combined with the general absence of joint cultivation leads to some difficulties in organising jhum cultivation on individual plots.

2.42 The pattern of land tenure and modalities of land allotment pose several problems when it comes to replacing jhuming by settled cultivation. The development of settled agriculture will require substantial investments in terracing, land shaping, irrigation, etc. The individual cultivator who is to do this must have some assurance that the fruits of his labour will continue to accrue to him and his dependents. This assurance can only be provided if he is given a permanent title to this land. Since it appears that the principle of individual ownership is generally accepted for land under settled cultivation there may not be much difficulty in this if the distinct and village councils can be persuaded to adopt a progressive policy. A cultivator who gives up jhuming and takes to settle agriculture may lose his rights in village lands (other than what he is using). He may well be reluctant to do this. This suggests that the transformation of jhum into settled agriculture has to take up for the whole village simultaneously. This will also help to solve the problem of the land in jhum cycle that is no longer required for crop husbandry. These lands could be converted to village forests, plantation, orchards or pastures.

Sector allied to agriculture

2.43 The hilly terrain of the north-eastern region offers ample scope for the development of horticulture and plantations. Fruit production is fairly widespread in the region and at present the area under major fruit crops is about 71 thousand hectares which is a little over 2 per cent of the net sown area. In the case of plantations, tea is of course well established in Assam. However, other plantation crops like coffee and

rubber are not very extensive, the area under coffee being 1,984 hectares and under rubber 1,250 hectares at present.

2.44 Animal husbandry is an important part of the traditional agricultural system. However, the pattern of animal husbandry in hill areas shows a significant difference from the plains and from the general all India pattern. In these areas the number of pigs and poultry in relation to population is far higher than the all India norm. Thus, excluding Assam and Tripura, the number of pigs per 100 population ranges from 11 in Mizoram to as much as 40 in Nagaland. The corresponding all India average is around one. In the case of poultry, the range in these five States/UTs is from 89 per 100 population in Meghalaya to 272 per 100 population in Mizoram. The all-India average in this case is around 25. These high levels are not observed in the case of cattle where the number per 100 population are broadly comparable to the all-India figure except in Mizoram and Nagaland where they are much lower.

2.45 The animal holding pattern seen in these hill areas reflects the prevalence of jhum agriculture which does not involve ploughing and therefore requires less by way of animal draught power. In some areas there are social inhibitions against milk consumption which in any case is of less importance from a dietary point of view because of the high level of meat consumption. However, there are signs of change. The pressure of urban demand has led to some growth of milk production and many of the inhibitions about milk consumption are disappearing. The main orientation of the system, however, is towards meat production. Here too the dependence is on pigs and poultry which can live on waste materials and crop residues so that intensive cultivation of feed/fodder or animal care is not required. However, despite the high levels of pigs and poultry relative to population, there are substantial imports of animals for meat from the plains.

Non-agricultural sectors and an infrastructure

2.46 In the traditional non-agricultural sectors the dominant activities are handloom weaving, sericulture and handicrafts. The region has around 13.6 lakh handloom, most of them being looms used mainly for household use rather than for the market. In the field of sericulture, the region has all the four varieties of silk, Mulberry, Muga, Eri and Oak Tasar. Handicrafts based on locally available materials like cane and bamboo, wood, conch shells, etc., are also fairly well spread.

2.47 In the modern sector the level of development is limited. There are only about 62 medium and large industrial units in this region of which 48 are in Assam. The total number of small scale units in the region was only 2653 in 1971. The low level of industrial development in the region is a consequence of a variety of factors. The problem does not lie in any lack of natural resources. As pointed out earlier, the region is exceptionally rich in these. The difficulties rise from the isolation of the region from national markets which alone can provide the scale of demand required for the optimum exploitation of the material and forest resources of the region. In addition there are further difficulties posed by the lack of entrepreneurship, the shortage of technical personnel and a traditional social structure that cannot find a place for the competitiveness and risk taking required in industry.

Infrastructure

2.48 From the point of view of infrastructure development the principal problem in this region is the inadequacy of communication facilities.

2.49 As far as railway facilities are concerned the Brahmaputra Valley is linked to the rest of the country via a meter-gauge line. There is nominal railway kilometrage in Nagaland and Tripura, but the other constituent units have no rail lines whatever. However, projects to convert the existing meter-gauge line to broad-gauge up to Gauhati and to extend the rail network into all the constituent units are underway.

2.50 With regard to roads the kilometrage of motorable roads per km. of area is below the national average in all the units except Assam and Tripura and substantially so in the case of Arunachal Pradesh, Meghalaya and Mizoram.

2.51. There is also a further problem of the inadequacy of links between the north and south banks of the Brahmaputra which is being corrected to some extent through new bridges across the Brahmaputra near Tezpur and Togighopa.

2.52 As far as power supply is concerned the hydel resources of the region are very large relative to requirements. The principal problem arises from the nature of the terrain which makes it difficult to deliver power to all points in the region.

ANNEXURE 2.1

Decadal variation in population

	1901 to 1911	1911 to 1921	1921 to 1931	1931 to 1941	1941 to 1951	1951 to 1961	1961 to 1971	1971 to 1981
1. Arunachal Pradesh . .	..	..	..	..	..	..	38·91	34·34
2. Assam*	16·99	20·47	19·93	20·37	19·87	33·06	34·95	36·09***
3. Manipur	21·71	10·92	16·04	14·92	12·80	35·04	37·53	33·65
4. Meghalaya . . .	15·71	7·21	13·83	15·59	8·97	27·03	31.50	31·25
5. Mizoram	10·64	7·90	26·42	22·81	28·42	35·61	24·93	46·75
6. Nagaland** . . .	46·75	6·55	12·62	6·04	8·66	14·07	39·88	49·74
7. Tripura	32·48	32·59	25·63	34·14	24·56	78·71	36·28	32·37
8.. All India . . .	5.73	0·30	11·00	14·23	13·31	21·52	24·80	24·75

*Population figures per Karbi Anglong are not available for 1901, 1911, 1921, 1931.

**Tuensang district excluded in decadal variations upto 1961.

***Projection.

ANNEXURE 2.2

Mineral Resources in the North-East

Resource	Category	Amount
1. Coal . .	(a) Proved	99 million tonnes
	(b) Indicates inferred	829 million tonnes
	Total	928 million tonnes
2. Crude Oil .	Proved indicated as of 1978	78.5 million tonnes
3. Natural Gas .	Proved and indicated as of 1978	63.6 billion cu. metres.
4. Limestone . .	Cement, Chemical and flux grade	3000 million tonnes
5. Iron ore . .	Average metal content above 40%	17·6 million tonnes
6. Fire clay .	not specific	2.1 million tonnes
7. Kablin . .	not specific	6.4 million tonnes
8. Lithomerge .	not specific	71.5 million tonnes
Fullers Earth .	not specific	17.0 million tonnes
10. Feldopar, .	not specific	40 thousand tonnes
11. Silliniamate .	not specific	10 thousand tonnes

Data Source : 2 and 3 from Petroleum and Chemical Statistic 1978-79, Ministry of Petroleum others from Bani Statistics of North-Eastern Region, 1980 North Eastern Council.

STRATEGY OF DEVELOPMENT

The previous chapter has dealt with some of the characteristic features of the north-eastern region which have to be taken into account in the design of any development strategy. To a certain extent the approach that is required is dealt with in the National Committee's reports on Hill Area Development, Tribal Area Development and on the Development of Chronically Flood Affected Areas. Nevertheless a fuller treatment which takes account of the special features of the region is necessary.

3.2 The north-eastern region is exceptionally rich in natural resources. The primary objective of development strategy must be to utilise these optimally and in a manner that maximises the benefits accruing to local people. This will require not merely additional investments in infrastructure and production facilities but also a programme of manpower development and measure to reorient the system of land tenure in the hill areas.

Agriculture

3.3 In the field of agriculture the problems faced are different and hence the strategy required will differ for hill areas and the plains. The foundation for any programme of agricultural development will be on an effective base for basic research and adaptive research and field trials. At present the research support is provided by the Assam Agricultural University and the ICAR Research Complex for the North-Eastern Region. However, facilities for localised adaptive research are limited. Technology has to be developed on an area specific basis and facilities for adaptive research will have to be put up by the States. The Committee would lay the utmost stress on this aspect and suggest that the State Governments take on greater responsibilities for adaptive research.

Jhum Cultivation

3.4 In the hill areas the dominant problem is the widespread prevalence of jhum cultivation. As pointed out earlier it is estimated that as much as 27 lakh hectares are subject to jhuming in the hill areas of the north-east. With the growth in population the jhum cycle is becoming shorter leading to a gradual deterioration in the quality of forest cover in the hills. Apart from this the low productivity of jhum agriculture is leading to a growing imbalance between food demand and availability. The promotion of a shift to settled cultivation in jhum areas must be a central element in the development strategy in this region.

3.5 Jhum cultivation was the response of the tribal community to a situation of abundant forest land, limited labour and the lack of flat lands suitable for food and fibre crops. The logic of jhum cultivation also led to a system in which the control of land was not vested with the individual but with a village council or chief.

3.6 There have been several schemes to control and transfer jhum cultivation. They have emphasised a shift to plantation or horticulture or terraced cultivation. It has been estimated that at the end of the Fifth Plan about 60 thousand hectares of jhum land and about 25 thousand families have been changed to settled cultivation under the various jhum control programme taken up through the NEC or under the State Plans. This amounts to barely 2 per cent of the area liable to jhuming and 6 per cent of the jhumia families. Hence the programme of jhum control has barely begun.

3.7 The problem of jhum cultivation is so widespread that all the households involved in jhum cultivation cannot shift to settled cultivation even in a 5-10 year framework. Hence the strategy for jhum control must distinguish between different areas on the basis of the extent to which the jhum cycle has become short and ecological problems created thereby. On the basis of surveys, jhum areas should be put into three categories:—

(i) Areas where the cycle is still above say, 10 years and where ecological problems are not yet acute. In these areas at present the emphasis should be on improving the productivity of jhum through better agronomic practices, land conservation measures and improved varieties;

(ii) Areas where the cycle has fallen below say 5 years and where ecological problems are already acute: These areas should be taken up on a priority basis for conservation to settled cultivation; and

(iii) Other areas: These areas will probably face acute problems in the near future. Hence, in this case, the immediate measures may be for improving jhum but there should also be a programme for the gradual introduction of settled cultivation.

3.8 A variety of models of settled cultivation relevant for jhum areas are available:—

(i) **Conservation to plantations.**—This is the earliest of the proposed strategies, and involves a total shift to a plantation, crop like tea or rubber.

(ii) **Terraced cultivation.**—This is being actively pursued in State Sector schemes and is being implemented with and without irrigation.

(iii) **Conversion to grassland.**—This is happening in certain areas where animal husbandry and dairying has developed.

(vi) **ICAR's three-tier systems.**—This involves crop husbandry with bench terracing in the lowest third of the slope, horticultural crops with half moon terracing in the mid-portion and forestry in the top third.

3.9 The problems of jhum cultivation is dealt with in greater detail in Chapter-5.

Valley Agriculture

3.10 In the case of the chronically flood affected plains the strategy must be to reorient the cropping pattern and crop varieties to suit the flood regime. The problems of these areas will be dealt with in greater detail in the Committee's Report on Chronically Flood Affected Areas. The dominant crop in these areas is paddy. The bulk of these areas are in Assam when 500-600 thousand hectares are planted under autumn paddy (sown in early June and harvested in August-September) and 1500-1600 thousand hectares under winter paddy (sown in June-July and harvested in December-January). It may be noted that while yields from autumn paddy are of the order of 700 kg of rice/ha. the yields from winter paddy are around 1100 kg. of rice/ha. However, in both cases yields have not shown any growth trend during the post Fifth Plan period. The other major paddy growing area is Tripura which has roughly 130-135 thousand hectares under autumn and winter paddy and Manipur which has about 35 thousand hectares under autumn paddy and 140 thousand hectares under winter paddy. In these areas, unlike the Assam, the difference in yield between the two seasons is less marked. In Tripura the yield figures for autumn and winter paddy being 1050 kg. of rice/ha. and in Manipur they are of the order of 1600 kg. of rice/ha. for both seasons. The primary problems of paddy cultivation in this region is of adjustment to the flood regime in the flood plains in the Brahmaputra basin. Paddy once it is established, can survive submergence upto 7 days or so. The real problem is to design a strategy for those areas where the period of submergence can be expected to exceed this. In such areas the Committee has suggested two approaches:

(i) The paddy varieties sown in the monsoon season must have a long duration so that they mature after the last flood ;

(ii) Cropping patterns should be adjusted to avoid the flood season and use the surface moisture, supplemented by irrigation for rabi and summer crops. In this connection, the programme to promote rabi wheat in rice growing areas is relevant.

Both these strategies are applicable in the flood affected areas of the Brahmaputra basin.

3.11 The extent of irrigation in this region is limited. Whatever irrigation is available is used for paddy. In 1976-77, 23 per cent of the paddy area in Assam, 7 per cent in Tripura and 42 per cent in Manipur was under irrigation. In all these states the potential for surface and groundwater irrigation is quite substantial. The development of this potential is vital if the strategy of avoiding the flood season is to be implemented. One important irrigation possibility in the area close to the river is the low cost shallow tube well. In the case of small farmers the utility of this option has been questioned on the ground that their holdings are highly fragmented. In such cases water can be lifted from the river, brought to a contour channel at some height and released to the fields below. Such a system would, of course, have to be in the public sector.

3.12 The low level of crop production technology in this region is reflected in the very low levels of fertiliser consumption which is of the order of 2-3 kg/ha. in Assam and Tripura, though it is somewhat higher in Manipur where it is around 12 kg/ha. The modernisation of agriculture in these valley lands will clearly require a massive increase in the use of fertilisers. Fertiliser consumption can only increase if leaching can be avoided. Hence the strategy of avoiding the flood season is important Blue-green algae systems and bio-fertiliser can provide a suitable source of nitrogen in water logged areas.

Horticulture

3.13 The spread of horticulture in the north-east has been mentioned earlier. The region is suitable for both tropical and temperate fruits and horticulture can provide a very lucrative alternative to jhuming. However, the present pattern of agronomic practices will need to be changed.

3.14 The development of horticulture will require a major extension effort to improve agronomic practices and place them on a more scientific and commercial basis. The success is extending new fruit crops like apples in Arunachal Pradesh suggests that such an effort can be mounted. The extension effort will have to be backed up by the provision of nurseries to supply suitable planting material and research to identify promising cultivator. The ICAR research complex and many nurseries that have been set up provide a part of the institutional infrastructure. However, there is a wide gap on the field effort. There is hardly any follow up after the plants are distributed resulting in heavy mortality and low productivity. This gap in the extension effort will have to be covered if horticulture development is to prosper. In order to do this major programme of technical personnel will also be needed.

3.15 The second major gap in the field is the lack of effective marketing support. In many cases marketing problems arise from the lack of communication facilities. Hence the horticulture programme must include the formation of growers cooperatives which would be supported by the proposed regional corporations for agricultural marketing. These cooperatives will have to be linked to processing facilities. It may also be necessary in the first instance to concentrate

in areas which are connected by road so that communication problems are minimised.

3.16 The development of horticulture is dealt with in greater detail in Chapter-6.

Plantations

3.17 The three principal plantation crops of relevance for the north-eastern region are tea, coffee and rubber. Of these the first two are relevant principally for hill areas and the last one for the plains.

3.18 The extension of plantations in hill areas can only be done slowly as the rural population is weaned away from low productivity jhum farming. A more rapid pace of development will lead to shortages of labour for working in plantations. In migration of plantation labour from outside of the sort which took place when Assam tea plantations were developed is, today, not acceptable to the people of the region. In fact, because of this possibility of immigration, State Governments appear to be reluctant to pursue this particular option.

3.19 The plantation development programme has to be based on the small holder approach. Compact areas can be taken up for development by a corporation with each individual family being given the right to about 2 acres. In the first stage the compact area would be developed by the corporation, with the individual being employed as labourers. Once the plants reach the bearing stage, the management would rest with the individual family who would have access to common facilities and technical advice from the corporation which would also take on the responsibility for marketing. The individual family would have the right of usufruct but would not have the right to alienate the land or convert it to some other use. Such an approach will help to ensure that plantation development takes place in an economically viable manner and that the benefits accrue to local people.

3.20. The development of plantation is dealt with in greater detail in Chapter-7.

Forestry

3.21 Even though the North-Eastern Region has abundant forest resources, these are not being exploited except in small pockets. Limited or restricted control of the State Government/ U.T. Administration on the forest areas, lack of population, lack of trained manpower, communication bottlenecks, absence of processing industries etc., are the factors standing in the way of efficient exploitation of the forest resources.

3.22 The rich forest resources of the north-east cannot be exploited unless the pre-investment survey identifies areas of low, medium and high stock so that priorities for afforestation and exploitation can be worked out for different areas.

3.23 It will also be necessary to extend the silvi-cultural control of the Forest Department to forests outside the reserved/protected category. The problem of roads will have to be taken care of by building in the required provision in commercial forestry schemes. Forest policy in this region will also have to take into account other activities like tasar culture and horticulture in drawing up plans for development.

3.24 The development of forestry is dealt with in greater detail in Chapter-8.

Animal Husbandry

3.25 It has been pointed out earlier that the animal husbandry system in the hill areas of the north-east is oriented towards the meat production. Hence the emphasis should be on pigs and poultry. However, in the plains and near urban areas in the hills milk-oriented developments are taking place.

3.26 In many ways the north-east is well-suited for animal husbandry. The high and well distributed rainfall provides excellent conditions for the development of grass lands which can remain green throughout the year. The region is full of nature forage consisting of perennial and annual plants. Meat consumption in the region is high. Despite this the hill areas of the region import substantial quantities of meat from outside.

3.27 The foundation of the animal husbandry programme is the upgradation of animal productivity through crossbreeding. The high altitudes in this region can allow high levels of exotic blood. In the case of cattle the upgradation programme will have to rely on frozen semen based artificial insemination. In the case of pigs besides pure bred exotics, cross bred boards may have to be used for infusion of 25% exotic blood so as to ensure wider coverage. Poultry development in the form of intensive poultry farms or upgradation of backyard poultry will also have to be based on cross breeding. The facilities required for producing the breeding animals are now in position in the form of regional breeding stations. Frozen semen is available at Khanapara. Hence the problem now is that of delivery.

3.28 With regard to feed requirements, pigs and poultry rely to a large extent on wastes, crop residue and local vegetation. However, prepared poultry feed for the interior poultry farms will be necessary for which purpose suitable feed factories will be required. In the case of cattle, range type farming based on grass lands and forage trees many of which have a high nutritive value may be the answer.

3.29 The upgradation of meat and milk productivity will not be achieved unless a suitable marketing system is established. In the case of milk the system of growers cooperatives linked to urban milk supply scheme provides a frame work. However, in the case of meat and eggs no such framework exists. Since the role of meat and eggs production is very substantial in the

animal husbandry system of the north-east, marketing supply in this area is vital. The proposed regional exploitation for agricultural marketing can provide this support at the apex of the marketing system. What is required is a village level organisation akin to the milk cooperatives. Unless this is done the bulk of the animal husbandry system may remain subsistence oriented and there may be little incentive to raise productivity through crossbreeding or better feed management.

3.30 The development of animal husbandry is dealt with in greater detail in Chapter-9.

Sericulture and Handloom

3.31 Sericulture is a traditional activity in the north-eastern region and comprises ericulture, mugaculture, oak tassar culture and mulberry culture. The problem and the measures required differ for each of these varieties.

3.32 Ericulture based on castor plantations is a low return activity and is conducted to a large extent for self consumption. The main problem lies in the fact that worm is reared on castor leaves. New plantations have to be created every year which involves considerable recurring expenditure. It is, therefore, necessary to extend the use of substitute plants like Alitanthus glandulosa or excelsa which is quick growing perennial species along with this improved spinning devices are necessary to raise productivity and earning per unit of time.

3.33 Mugaculture is also indigenous to the region. Muga seeds are procured from hill tracts though the worms are reared in the plains. Because muga worms deteriorate in the plains the whole operation has to be started a new every year. Muga plants take five years to grow and a vast area of high land is required to cultivate them. The returns to the family from muga rearing are not very high because of low productivity at all stages from the plantation to the laying to the reeling. Any improvement in mugaculture must depend on the measures to raise productivity like intensive rearing of quality seed sources, preservation in cold storage of seed worms, avoidance of the hazardous rearing period etc.

3.34 Mulberry culture is also traditional to the region. However, because the culture is age old, there is no standard breed of silkworm in the region and the worms produced are of inferior quality. Moreover, the plantation are often of mixed varieties of mulberry which can affect yarn quality adversely. Therefore, the crucial elements in the strategy have to be the rearing the high silk yielding variety of silk worm race and improvement of leaf yields by extension of high yielding varieties and appropriate agronomic practices.

3.35 Oak tassar culture is a more recent introduction. However, so far it has caught only in Manipur. If the labour used is essentially unemployed or under-employed the return from oak tassar culture are fairly attractive. With improvements in yield rates and sex ratio the returns can be raised further. Since oak tassar offers an important avenue for settling jhum as it is necessary to pursue these productivity improvement measures.

3.36 A general problem affecting all areas of seri-culture is the low productivity at the reeling stage and the exploitation by middlemen. Hence the extension of improved spinning devices as well as the provision of raw material and marketing support is necessary. In this respect the Group Centre approach described in the National Committee's Report on Village & Cottage Industries along with the district level supply and marketing society recommended in that same report can provide a suitable organisational framework.

Handloom

3.37 The most widespread industrial activity in the region is handloom weaving. Traditionally this activity was based on cotton from jhum plots which was spun into yarn and woven generally on loin looms in to cloth for household use. Very limited quantities were sold or bartered. The situation has changed now and purchased yarn has replaced loom spun yarn. With the saving in the time taken previously for spinning, the output per handloom can go up.

3.38 The handlooms in this region are not generally commercially oriented. The width of the looms is such that the type of fabric that they can manufacture is restricted to certain items in the traditional costumes of this region. The usefulness of these looms and the traditional designs for wider commercial application needs to be studied. What is required is an integrated effort at design, development and market promotion.

3.39 The development of sericulture and handlooms is dealt with in greater detail in Chapter-10.

Industry and Minerals

3.40 The limited development of the modern industrial sector has been noted earlier. This is reflected in the fact that in the recommendations of the National Committee on the Development of Backward Areas presented in the Report on Industrial Dispersal the whole of the north-east is included in the areas that should be eligible for incentives for industrial dispersal.

3.41 The types of industries that can be promoted in the north-eastern region fall broadly within the following categories:—

(i) Major raw material based industries, which in the north-east would be mainly paper, cement and petro-chemicals.

(ii) Industries to supply local demands, where the scale of local requirements is large enough to sustain an economically viable unit.

(iii) A variety of small industries falling in category (ii) above or based on agro-processing e.g., fruit canning, meat processing, timber processing etc.

The essential task for planning at this stage is to identify the potential for development, as has been done for cement and paper, and to promote these industries in a manner which will maximise local impact. At the present stage of development of entrepreneurship and technical skills the impact of small industries based on local markets or on agro-processing may be greater. Hence industrial promotion must be directed to these types of industries rather than to large capital intensive projects.

3.42 It is essential that industrial development in this region should involve local people to the maximum possible extent. In the case of large industry dependence on entrepreneurs from outside the region or on the public may be unavoidable in the immediate future. However, in the field of small and medium industries, local entrepreneurs should be promoted vigorously. This will require an effective programme of entrepreneurial development and a support system for small industry. This Committee has dealt with this aspect in some detail in its Report on Industrial Dispersal and Report on Industrial Organisation. The measures outlined there need to be implemented with particular vigour in the north-east as industrial development without enough of a local impact could generate many tensions in the region.

3.43 The development of industry in the north-east is dealt with in greater detail in Chapter-11.

Transport Development

3.44 Many development opportunities in the north-east cannot be exploited because of the lack of transport facilities. Hence investments in this sector are, to a large extent a pre-condition for effectively implementing not merely industrial development programmes but also market oriented programmes in horticulture, plantation development and village industries.

3.45 The theoretical transport requirements of the region for optimum development are so vast that they cannot be met for a long time. At the present stage of development transport development in the north-eastern region would have to be based on the specific needs of each project and programme. Moreover, given the large gap in requirements, every attempt must be made to locate projects and programmes in manner that minimise the need for additional infrastructure. Thus market oriented horticulture can be developed fast in areas already served by roads. Forest based industries can be located in forest areas which can be readily opened for exploitation. Despite this further major investments in transport will be required and should be included in the plans of the States, the NEC and the Centre. The resources available for transport development can be stretched further if standard of construction are recommended in the light of likely traffic to identify possible economies.

3.46 The different components in the Transport system viz., railways, roads, inland water transport, air transport have to be developed as an integrated system. Piecemeal improvements or extension of network may not serve much purpose if they do not fit in with the total capabilities of the system at all points.

3.47 Transport development is dealt with in greater detail in Chapter-12.

Manpower Development

3.48 The development programmes taken up in the north eastern region will run aground for lack of technical personnel if suitable programmes of manpower development are not taken up. Such programmes are also necessary to ensure that a development of the area is accompanied by development of the people.

3.49 The North Eastern Council has been making efforts for the development of manpower, both technical and non-technical in four ways viz., (a) sponsoring of personnel from this region, for graduate and post-graduate training, (b) short duration training courses, (c) setting up of new institutions in the region and (d) expansion or strengthening of institutions already existing in the region.

3.50 Most of the industrial States and Union Territories in this region are too small to be able to sustain the full range of expenditure on education and training which is the charge of State Governments in the rest of the country. Hence the special role played by the North Eastern Council in this regard is crucial and should be strengthened.

3.51 It is generally noticed that in many sectors of development there is a paucity of skilled and managerial manpower. Attempts have been made to get the necessary manpower from the rest of the country on a short term basis. At the same time parochialism also steps in questioning such introductions. The pace of development of the potential of the north-east at present can certainly be considered very slow. The Committee has given a birds eye view of the tremendous potential available in this area which can be developed in the interests of the region, its people and also the nation-wide leadership will be required to ensure that development is not hindered by lack of necessary technical and managerial personnel and attitudes of parochialism. It is not easy to get top quality personnel from the rest of the country without special incentives. The North Eastern Council can give the leadership in starting a dialogue and laying down the necessary norms in manpower recruitment and appointment for a possible aggressive development policy. The States/UTs which are members of the NEC must honour the consensus reached in the NEC.

Local Participation

3.52 There are many commodities in the north-east which are being exposed to a market economy for the first time. The problems of exploitation that arise because of this have been indicated in an earlier chapter. In this situation measures to protect the tribal from exploitation are very necessary. As far as land holdings are concerned, the hill areas of the north-east, because of the system of land tenure prevalent there, have not faced this problem. However, this is due to the fact that the bulk of the area in the region is only suitable for subsistence agriculture. With the development of industrial ownership and commercially oriented agriculture, particularly in the form of horticulture and plantations, the possibilities of land alienation and exploitation may arise, whatever be the legal position. In the modern sector, the near monopolisation of even petty opportunities by non-tribals has been mentioned earlier. Clearly, a quickening of the pace of development in the hill areas of this region carries with it the risk of the tribal being exploited. Protective and promotional measures to avoid this must be an integral part of the development strategy for this region.

3.53 Protective measures can take a variety of forms like restrictions on land transfers, restrictions on the entry of outsiders for purposes of trade (as in Arunachal Pradesh), etc. However, protective measures are seldom enough and are readily evaded by benami transactions. Hence promotional measures to encourage, train and assist tribals, particularly the educated and urbanised ones, to utilise the opportunities for small industry, transport operations, trade and other services are equally important. What is required is a supporting structure for credit delivery, marketing raw material supply and technical assistance that can provide a well thought out package. In tribal areas in other parts of the country, Large sized Multi-purpose Societies (LAMPS) have been established for this purpose. Regional Rural Banks have also undertaken programmes of wide-ranging support. Measures of this nature will have to be introduced in this region to assist the tribal in meeting the challenge of the modern economy.

3.54 The traditional structures like Village Councils can be used to secure the participation and involvements of people in the development effort. These Councils can provide a point of contact between the State and the people. The ascent has to be on what people can do to improve their prospects with some help from the state.

4. ADMINISTRATIVE STRUCTURE

Political and administrative arrangements in the north-eastern region differ from arrangements in other parts of the country in two respects: (a) the existence of a regional body viz., the North Eastern Council and (b) the fact that extensive powers are vested in the district councils in some of the tribal areas in the region.

The North Eastern Council

4.2 The North-Eastern Council has been set up under an Act of Parliament and has its members the Governors/Lt. Governors and Chief Ministers of the States and Union Territories. According to the Act one of the members of the Council is nominated as Chairman by the President of India. Until recently the Chairman was the common Governor for Assam, Manipur, Meghalaya, Nagaland and Tripura.

4.3 The functions of the Council, as indicated in the Act, are as follows:

(1) The Council shall be an advisory body and may discuss any matter in which some or all of the states represented in that Council, or the Union and one or more of the States represented in that Council, have a common interest and advise the Central Government and the Government of each State concerned as to the action to be taken on any such matter and in particular, may discuss and make recommendations with regard to:—

(i) any matter of common interest in the field of economic and social planning;

(ii) any matter concerning inter-State transport and communications;

(iii) any matter relating to power or flood control projects of common interest.

(2) For securing the balanced development of the north-eastern area, the Council shall forward proposals:

(a) Formulating the States represented in the Council a unified and coordinated regional plan (which will be in addition to the State Plan) in regard to matters of importance to that area;

(b) Regarding the priorities of the project and schemes included in the regional plan and the stages in which the regional plan may be implemented; and

(c) regarding the location of the projects and schemes included in the regional plan to the Central Government for its consideration.

(3) The Council shall:

(a) review, from time to time, the implementation of the projects and schemes included in the regional plan and recommend measures for effecting coordination among the Governments of the States concerned in the matter of implementation of such projects and schemes;

(b) Where a project or scheme is intended to benefit two or more States, recommend the manner in which:

(i) such project or scheme may be executed or implemented and managed or maintained, or

(ii) the benefits therefrom may be shared; or

(iii) the expenditure thereon may be incurred.

(c) on a review of progress of the expenditure, recommend to the Central Government the quantum of financial assistance to be given from time to time to the State or States entrusted with the execution or implementation of any project or scheme included in the regional plan;

(d) recommend to the Government of the State concerned or to the Central Government the undertaking of necessary surveys and investigation of projects in any State represented in the Council to facilitate consideration of the feasibility of including new projects in the regional plan.

(4) The Council shall review from time to time the measures taken by the States represented in the Council for the maintenance of security and public order therein and recommend to the Government of the States concerned further measures necessary in this regard.

4.4 The support provided through the NEC is a very significant component of the total development effort in this area. An examination of the Plan schemes of the NEC shows the following types of schemes :

(i) Large generation and transmission schemes.

(ii) Major inter-state roads and bridges.

(iii) Mini cement plants.

(iv) Regional Seed Farms, Orchards-cum-Nurseries, animal breeding farms, fish seed farm etc.

(v) Surveys and projects investigations.

(vi) Pilot or demonstration projects for jhum control, fruit and vegetable processing, plantation development, sericulture etc.

(vii) Regional facilities for medical and technical education.

(viii) Manpower training programmes.

(ix) Regional marketing organisation.

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4.5 In general the NEC takes up schemes which are required for developing the region but which are beyond the resources of any individual State. However, there are some schemes like the pilot projects on jhum control which are innovative and need central guidance.

4.6 The development strategy for this region will require substantial new developments in agriculture, animal husbandry, horticulture, plantations, etc. These developments will require the establishment of facilities for research, new training institutions, nurseries, breeding farms, etc. Many of these facilities have a certain optimum scale of operation. Below this scale they are too costly and wasteful of technical expertise. At the present stage the optimum size for many facilities would be beyond the requirements of individual States. In these cases the North-Eastern Council can set up these facilities to serve several states thereby allowing these states to benefit from economies of scale. As needs grow changes will be required and states may well be in a position to set up optimum scale units for themselves. However, till that time the NEC will have to play an important role in the provision of basic facilities for research, training, input supply, marketing, etc.

4.7 The new developments to be promoted in different sectors will also require a close link-up between basic research, adaptive research, field trials and extension effort. This link-up will require supervision by high level technical personnel who may not be available in all the States. Because of this factor and the fact that most of the existing research facilities in the area are of regional character, the NEC has to accept responsibility for the first stages of new technological thrusts. The NEC can do this in the form of pilot projects which when proved successful, can be emulated by the States. Thus, at the present stage of development, the NEC should have the responsibility and the corresponding capability for high level technical supervision in fields like crop production, horticulture, plantations, animal husbandry etc.

4.8 The regional facilities and the technical supervision provided by the NEC must be used effectively by the States. In order to ensure this a careful assessment of requirements must precede any investment in new facilities or acquisition of technical expertise by the NEC. Once the facilities are set up in the region the NEC advisers must travel around in the region to see whether and how the facilities are being used, to build up local expertise in the State Governments and advise State Governments as to how best they can use the regional facilities.

4.9 Ideally the plans of NEC and the individual States should be fully coordinated so that in every sector there is a clear understanding about who is to do what. The responsibility for this coordination lies at present with the Planning Commission which discusses plan outlays with each State and with the NEC. Hence the Planning Commission must try and ensure that there is no overlap or duplication in the NEC plan and the plans of the individual states. They must also ensure that the development thrusts initiated through the NEC are pursued by the States. However, the Planning Commission is very remote from the field and therefore not fully in the picture. In order to correct this, the Planning Commission can use the expertise available in the NEC keep itself informed about local developments. The peripatetic advisers of the NEC can provide the Planning Commission with an effective feed back to monitor the plans Coordination can be improved if the Planning Commission nominates an officer to liase with the NEC on a full-time basis.

District Councils

4.10 The special features of tribal policy in the North-Eastern region have been reflected in the provisions contained in the Sixth Schedule to the Constitution. This schedule applies to the States of Assam, Meghalaya and the Union Territory of Mizoram but not to the other States and Union Territories in North East.

4.11 The Sixth Schedule provides for the formation of autonomous districts and within these autonomous regions in the tribal areas of the following districts:

ASSAM

1. The North Cachar Hills District.
2. The Mikir Hills District.

MEGHALAYA

1. Khasi Hills District.
2. Jaintia Hills District.
3. The Garo Hills District.

MIZORAM

1. The Chakma District.
2. The Lakher District.
3. The Powi District.

4.12 In terms of geographical coverage, the applicability of the Sixth Schedule has been considerably modified since the initial enactment. The principal changes arose with the reorganisation of the North-Eastern region. In Manipur, Tripura there is a provision under the State Acts for the constitution of district Councils in tribal areas. In Nagaland, under State Act statutory recognition has been given to village and area Councils. Each autonomous district or region set up under the Sixth Schedule has a Council which has the power to make laws with respect to:

(a) the allotment, occupation or use, or the setting apart, of land, other than any land which is a reserved forest, for the purposes of agriculture or grazing or for residential or other non-agricultural purposes or for any other purpose likely to promote the interests of the inhabitants of any village or town. (Provided that nothing

in such laws shall prevent the compulsory acquisition of any land, whether occupied or unoccupied, for public purposes by the Government of the State concerned in accordance with the law for the time being in force authorising such acquisition);

(b) the management of any forest not being a reserve forest;

(c) the use of any canal or water-course for the purpose of agriculture;

(d) the regulation of the practice of jhum or other forms of shifting cultivation;

(e) the establishment of village or town committees or councils and their powers;

(f) any other matter relating to village or town administration, including villages or town police and public health and sanitation;

(g) the appointment or succession of Chiefs or Headmen;

(h) the inheritance of property;

(i) marriage and divorce;

(j) social customs.

4.13 The councils also have extensive powers at taxation. Specifically the district councils have the power to assess and collect land revenue from all lands under their jurisdiction and to levy and collect taxes on lands and buildings and tolls on persons resident within such areas. In addition, the District Councils have the right to levy and collect taxes:

(a) taxes on professions, trades, callings and employments;

(b) taxes on animals, vehicles and boats;

(c) taxes on the entry of goods into a market for sale therein and tolls on passengers and goods carried in ferries, and

(d) taxes for the maintenance of schools, dispensaries or roads.

4.14 District Councils also have a right to share in the royalties accruing from licences or leases for prospecting or extracting minerals granted by the State Government. There is a provision for a District Fund into which all moneys received by the Council can be credited.

4.15 District Councils have the right to establish, construct or manage, primary schools, dispensaries, markets, cattle, ponds, ferries, fisheries, roads, road transport and waterways in the district. There is a general enabling provision which allows the Governor to entrust to a District Council, with its consent, functions in relation to agriculture, animal husbandry, community projects, cooperative societies, social welfare, village planning or any other matter to which the executive power of the State extends. The Schedule also grants certain judicial powers to the regional and district councils and certain rule making rights relating to for example, regulation of money lending and trading by non-tribals.

4.16 The justification for the special provision for tribal areas is elaborated at some length in the Report of the North-East Frontier (Assam) Tribal and Excluded Areas Sub-Committee set up by the Constituent Assembly. At the commencement of the Constitution many of the Hill/Tribal areas of the North East were a part of Assam State. After reviewing the pattern of administration in the pre-independence period, the Sub-Committee drew attention to certain special features of the tribal areas and recommended constitutional provisions and safeguards to allay the suspicions and fears of the hill people.

4.17 The description of the provisions of the Sixth Schedule and the background which led to them makes it clear that many of the powers of the District/Regional Councils arise from a situation in which these areas were under a State Government dominated by plains people. With the reorganisation of the north-eastern States the position has changed substantially and except for the areas in Assam, the other autonomous districts recognised in the Sixth Schedule are in political units dominated by hill tribals.

4.18 Many of the powers given to district councils are similar to the powers given to local bodies elsewhere. However, in certain respects like land rights and control over forests they have more extensive powers. In these cases the authority vested in the District Council can limit the ability of the State Government to operate in these fields.

4.19 From the point of view of development there are two important changes which are required. The widespread nature of community rights in land have led to difficulties in individual development. The incentive to undertake improvements and increase productivity has been blunted as the individual does not know how long the land will be in his possession. Permanent rights over settled land are increasingly being recognised and the movement from community to individual ownership has begun. However, the individual needs to be given a legal right to the land. The District Councils can play an important role in this since the authority over land tenure is vested in them. State Governments cannot pursue programmes for jhum control without such assistance from District Councils.

4.20 The second area in which certain changes may be necessary is in the management of forests. A large part of the forests area in the north-east is under the control of District Councils. However, these Councils do not have the technical staff to plan and manage these forests. A certain commonality of approach in silvicultural practices is necessary and, to ensure this, silvicultural control over District Council forests should be allowed to rest with the State Forest Departments.

5. JHUM CULTIVATION

Jhum cultivation is a widely prevalent traditional form of cultivation of land on hill slopes in the hill areas of the North-East. It involves cutting of trees, bushes, etc. on the hill slope upto stump level in winter, drying it and finally burning the debris to clear the land for cultivation of different crops before the on set of rains. After one crop season or two the area is abandoned in favour of a new site within a definite area, while the hutments of the village generally remain permanent. The method of allotment of a site of individual families of a village varies from tribe to tribe. In most of the cases, it is decided by the village council (Mizo Hills) or by village elders through lottery system (Manipur and Mikir Hills). 'Jhum paddy' is the dominant crop of these lands. Other crops grown are, maize, millets, beans, tapioca, yam, sweet potato, turmeric, ginger, cotton, tobacco, chillies, sesamum and leafy vegetables. In some plots papaya is grown and the green fruits are boiled for feeding to the pigs. All these crops are grown under as rainfed conditions and the harvesting starts sometime from August onwards. The paddy grown in jhum field matures comparatively earlier and, therefore, become available for family consumption much earlier than that from the valley lands. In certain areas, pure crops of paddy, maize, ginger, etc. are taken in plot, while other crops are grown in a separate plot.

The present position

5.2 There is a certain paucity of reliable information on the extent and value of jhum cultivation in the north-eastern region. However, estimates prepared by the States/UT's in the region in 1974, based on the total area owned by different villages practising jhuming is given in Table 5.1 below to give rough idea of the extent of jhuming.

TABLE 5.1

State/Union Territory	Area available for shifting cultivation. (000 hectare)	Area sown at one point of time	Col. (3) as per centage of col. 2 (%)	Tribal families involved (000)	Area cultivated per tribal family (hectares)
1	2	3	4	5	6
Arunachal Pradesh	248·58	92·00	37·0	81	1·13
Assam . .	498·30	69·60	13·0	58	1·20
Manipur .	100·00	60·00	60·00	50	1·20
Maghalaya .	416·00	76·00	18·2	68	1·12
Mizoram .	604·03	61·61	10·2	45	1·37
Nagaland .	608·00	73·54	12·1	80	0·92
Tripura . .	220·79	22·30	10·1	43	0·51
NE Region .	2,695·70	455·05	16·8	425	1·07

The above figures for the areas sown at one point of time may include some areas under settled cultivation.

5.3 The National Sample Survey undertook a survey of jhum cultivation in 1976-77. The areas covered were the entire rural areas of Arunachal Pradesh, Meghalaya and Tripura, two hill districts of Assam (Karbi Anglong and North Cachar) and five hill districts of Manipur (East, West, North, South and Tengnoupal). Nagaland Mizoram were not covered in this survey The Central Sample whose results are reported below covered 520 villages and about 43 thousand households.

5.4 The NSS survey cannot provide estimates of the actual areas under jhuming. However, data on the percentage of households practising jhuming and permanent cultivation in the hill areas covered are available and are reported below in Table 5.2.

TABLE 5.2

Prevalence of Jhum Cultivation

State	Percentage of tribal household by types of cultivation			
	Jhum Cultivation	Jhum and permanent cultivation	Permanent cultivation	Not doing any cultivation
1. Arunachal Pradesh	33·5	24·2	29·6	12·7
2. Assam. . .	18·6	24·0	49·5	7·9
3. Manipur :				
(a) Tribals . .	46·1	34·5	15·4	4·1
(b) Others* . .	50·4	40·6	8·3	0·7
4. Maghalaya . .	15·4	38·2	31·6	14·8
5. Tripura . .	12·1	11·6	53·2	23·1

Sources: Sarvekshana, April, 1979, pg. 629—631.

Manipur is the only one of the five units which shows a significant level of jhum cultivation amongst the non-tribal population.

5.5 As this table shows the incidence of permanent cultivation is fairly substantial in all cases. The impression that people are not used to permanent cultivation is not entirely correct.

5.6 The NSS survey contains some data on the length of the jhum cycle in the selected villages which is given in Table 5.3 below:

TABLE 5.3

Duration of Jhum Cycle

Cumulative Percentages

	Upto 5 Years	Upto 6 Years	Upto 7 Years	Upto 8 Yers	Upto 9 Years	Upto 10 Years	11 Years and more	Not recorded
1. Arunachal Pradesh	28·2	33·0	42·4	54·1	58·8	85·9	91·8	8·2
2. Assam	88·5	92·3	..	..	..	..	..	7·7
3. Manipur	71·2	79·7	..	..	..	..	..	6·8
4. Meghalaya	3·1	31·7	29·8	55·7	66·4	80·9	99·2	0·8
5. Tripura	81·5	96·3	..	..	..	..	..	3·7

Source : Savekshana, April, 1979, pg. S-633

5.7 The figures in this table differ significantly from the implicit jhum cycle indicated in Table 5.1. The NSS data suggests that the Jhum cycle in Arunachal Pradesh and Meghalaya is significantly longer and in Assam and Tripura significantly shorter than what is indicated in the data collected by the States/U.Ts. in 1974 which is reported in Table 5.1. The significant point thrown up by the NSS data is the range in the length of the jhum cycle. Whatever may be the average there are many areas where the jhum cycle is much larger or much shorter than the average. Hence the strategy for Jhum control cannot be based on the average figure for a large areas, but must take into account the condition in each area.

5.8 In Jhum cultivation, the farmer shifts from plot to plot and some arrangement for regulating this shift becomes necessary. Hence the logic of Jhum cultivation led to a situation in which the control of land was not vested in the individual but in the community. According to the studies referred to earlier in Chapter II, the agency responsible for the allocation of land to each household was in some cases the chief or headman and in some a village council. The NSS Survey referred to earlier collected data on this which is reported in Table 5.4 below :

TABLE 5.4

Distribution of Jhum Villages by type of land distributing authority

States/U.T.s.	Land Distributing Authority				
	Govt.	Village headman/ Chief	Village Council	Selected by individual	Not recorded
1. Arunachal Pradesh	..	2·4	24·7	69·4	3·5
2. Assam	11·5	57·7	..	30·8	..
3. Manipur	..	30·5	23·7	45·8	..
4. Meghalaya	0·8	32·1	1·5	65·6	..
5. Tripura	11·1	7·4	..	81·5	..

5.9 This table suggests that community control over land use may be less extensive than is commonly supposed. The percentage of cases where the selection is supposed to be made by each individual seems large and even allowing for response problems and survey errors, it would appear that the authority of headmen/chief or village council is not as direct as is commonly supposed, e.g. in the papers submitted for the seminar on the north-east (Ref. paras, 2.35 to 2.42). There seems to be a discrepancy between picture of land tenure that emerges from descriptions of the tribal society of the region and the data thrown up by the NSS survey. This difference needs to be probed further.

5.10 The actual pattern of cultivation of Jhum plot is on a household basis. Communal effort is rare except perhaps in the first stages when forest land is being cleaned. Jhum cultivation is fairly labour intensive during the slash and burn operations. Though precise data on the number of mandays required are not readily available, research studies show a very wide range from 150 to 300 mandays per hectare. The research results generally indicate that 30-40 per cent of the labour requirement is for the preparation of land for cultivation by felling of trees, removal of overgrowth, etc.*

*Rural life in Assam Hills, Case studies, Four Villages" Agro-Economic Research Centre for North East India, Jorhat, 1969.

5.11 The high labour requirements of Jhum cultivation, combined with the prevalance of nuclear families limits the area operated by each Jhum household. Some data on this as reported by the NSS, are given in Table 5.5 below:

TABLE 5.5

Land holdings of tribal households

State/U.T.	Average area per Jhum cultivating household (hectare)	Average no. of Jhum plots per Jhum cultivating household
1. Arunachal Pradesh	1·83	2·21
2. Assam.	1·02	1·60
3. Manipur	0·99	1·27
4. Meghalaya	0·61	1·39
5. Tripura	0·50	1·05

Source: Savekshana, April 1979, page S. 690.

5.12 In Jhum cultivation, mixed cropping is common. The yield rates for paddy, the principal food crop, reported in the NSS survey and the corresponding state level yields (which relate mainly to settled agriculture) are reported in Table 5.6.

TABLE 5.6

Paddy Yields, 1976-77

(Kgs/ha)

	In Jhum agriculture*	In State as a whole**
1. Arunachal Pradesh	649	886
2. Assam . . .	1172	933
3. Manipur . . .	1367	1507
4. Meghalaya . .	461	1199
5. Tripura . . .	334	1117

*Based on NSS for 1976-77.

**Based on NECs statistics.

These data have to be interpreted cautiously. However, yields appear to be significantly lower in Jhum cultivation except in Manipur and Assam. Some calculations suggest the return per manday in Jhum cultivation may be of the order of Rs. 2.00 to Rs. 2.50 only*.

*(i) "Rural life in Assam Hills : Case Studies of Four Villages" Agro-Economic Research Centre for North-East India, 1969.

(ii) "Report on the Development of North-Estern Region: Some Aspects", Govt. of India, Planning Commission, 1977.

5.13 Apart from low productivity jhum cultivation poses very serious erosion hazards. Studies done by the ICAR Research Complex for the North-Eastern regions show the following picture on soil erosion from 60°—70° slopes:

	Soil erosion t/ha/yr.
First year . . .	146·6
Second year . . .	170·2
Abandoned Jhum (First year fallow) . . .	30·2
Natural bamboo forest .	8·2

The significant point in this data is that erosion problems are significantly worse when a Jhum plot is not abandoned but cultivated for a second year. With the growing pressure on land, there could be a tendency to exploit jhum lands more intensively either by cultivating a plot for more than one year or by shortening of the Jhum cycle by going into steeper lands. According to the NSS survey, a significant proportion of jhum plots are cultivated for more than one year, the relevant data being as follows:

	Percentage of Jhum plots cultivated for 2 years or more
Arunachal Pradesh .	89·5
Assam	73·9
Manipur . . .	18·9
Meghalaya . . .	22·5
Tripura	10·3

As regards the shortening of the jhum cycle, relevant time series data are not available. However, it can be presumed that the cycle is shortening since the size of the population is growing and the number of dependent on agriculture is high. The high rate of population growth in most parts of the region has been referred to earlier (of para 2.11). As for dependence on agriculture is as follows:

	%
Arunachal Pradesh .	80·4
Assam	76·7
Manipur . . .	71·3
Meghalaya . . .	81·7
Mizoram . . .	85·2
Nagaland . .	79·4
Tripura	76·6
All-India . . .	72·0

Present efforts

5.14 The earliest attempt at tackling the problem of shifting cultivation was made in the fifties by the then Assam Government by introducing plantation of cash crops like rubber, coffee, black pepper and cashewnut with the objective of encouraging Jhumias to take to these crops. Major thrust was, however, given in the Fifth Plan period when three different programmes were introduced in the States and Union Territories of the region. These were:—

(i) Soil conservation schemes in the States Plan;

(ii) Centrally Sponsored Scheme of pilot projects for the control of shifting cultivation; and

(iii) Certain schemes for the control of shifting cultivation under NEC.

5.15 All these programmes are, however, being implemented by the State/UT Governments themselves, the latter two being executed under the guidance of the Central Government. Under the NEC's programme, eight pilot schemes of soil conservation and Jhum control were taken up in the seven constituent units located in major catchment areas. Under these eight NEC schemes 9698 hectares of land was developed for settling 5187 families in permanent agriculture at a total expenditure of Rs. 486.16 lakhs. The average cost of settlement of a tribal family worked out to about Rs. 8,240 and for reclamation of one hectare to Rs. 5,013.

In all 60,000 hectares have been developed and 25,000 families reported to have been settled upto the end of Fifth Plan under the various Jhum control programmes taken up through NEC or under State Plans.

5.16 A broad evaluation by the North-Eastern Council of the efforts made so far is reported in the background paper prepared for NEC meeting in December, 1980. This evaluation suggests the following trends:

(a) The hill tribes of the region have become aware of the ill effects of jhuming, dwindling productivity of the Jhum fields, and

enormous labour involved in jhum cultivation. This point is corroborated by the NSS Survey. This has generated a public demand for greater investment by the Government towards rehabilitation schemes. A variety of factors like the reduction in the Jhum cycle, population pressure and gradual socio-economic change and improved communications have probably led to this.

(b) No single pattern can be evolved as a common solution for the entire region for tackling the problems. The pattern of settlement of Jhumia families will have to be devised for location, based on climate, physiography, land use and traditional occupation.

(c) Allotment of wet land terraces with assured irrigation has been the most effective means of attracting Jhumias to settled agriculture, particularly among traditional paddy growing tribes. Similarly, use of slopes for horticultural/cash crop plantation has become popular in States like Mizoram, Tripura and Meghalaya, particularly in such areas where the produce has found quick and easy market, giving much higher net returns than even from wet land terrace. In contrast, upland terraces involving cultivation under rainfed conditions have been abandoned.

(d) The tribals have not been able to achieve maximum benefits from the settled agriculture, mainly due to the complete absence of extension service, keeping them ignorant of improved agricultural technology. Those allotted wet land terraces with irrigation continue to raise only one crop in a year, while those allotted upland terraces cultivate the field like a Jhum field. The horticultural/cash crop plantations on slopes are badly in need of proper after-care.

(e) The tribals have become conscious of money oriented economy and therefore would readily respond to any project with assured returns. Schemes carrying certain dose of incentive will always find easy acceptability provided there is enough ground work done to ensure proper marketing of surplus produce and prevention of exploitation by middlemen.

5.17 There are certain schemes run by State Governments either as part of the Soil conservation programme or as special schemes for Jhum rehabilitation.

5.18 A more detailed evaluation of the State Government run Jhum control scheme in Meghalaya is available. The physical achievements of the schemes between 1974 and 1980 are as follows:

TABLE 5.7

Physical Achievements and expenditure of Jhum control scheme in Meghalaya

Item	Physical achievements	Expenditure (Rs. Lakhs)	Percentage Distribution of expenditure
1. Terracing and reclamation	5558 ha	187·53	41·1
2. Follow up . .	..	65·03	14·2
3. Afforestation . .	5007 ha	67·19	14·7
4. Irrigation . .	2445 ha	63·28	13·9
5. Dwelling houses .	1665 ha	33·30	7·3
6. Link roads . .	158·3 km & 32 culverts	29·40	6·4
7. Others . . .	..	10·84	2·4
		456·57	100·00

Thus the direct cost per hectare of terracing and reclamation works out to Rs. 3374 and the total cost per hectare of terraced/reclaimed land works out to Rs 8,215.

5.19 The scheme as presently implemented involves the following:

(i) Land development for permanent cultivation at 1 ha. per family.

(ii) Cash crop plantation at 1 ha. per family.

(iii) Supply of inputs at a subsidised rate on a sliding scale for three years.

(iv) Subsidy of Rs. 2,000 for construction of dwelling houses to deserving cases only.

(v) Construction of link road from nearest PWD roads.

(vi) Provision of drinking water.

(vii) Provision of other rural amenities by concerned departments.

5.20 The scheme is implemented through the Soil Conservation Department. However, there is a District Level Coordination Committee with the Deputy Commissioner as the Chairman, the Divisional Soil Conservation Officer as Secretary and the different concerned departmental heads as members. The respective District Councils are also members of this Committee. At the State level there is a coordination committee under the chairmanship of the Chief Secretary with the Director Soil Conservation as Secretary and the heads of the concerned departments as members. These arrangements for inter-departmental coordination have been made at district and state level.

5.21 The reaction of the beneficiaries to the scheme and the views of the Department of Soil Conservation on these reaction are as follows:

(i) Rainfed terraces without irrigation are not suitable for crop cultivation and irrigation is necessary. The Department accepts the

usefulness of irrigation, but draws attention to the assured rainfall conditions in Meghalaya and the difficulty in providing irrigation in hill areas.

(ii) Due to lack of irrigation weed growth is more and hence more labour is needed for weeding. The Department accepts this but asserts that weed growth in unirrigated Jhum Plots is roughly the same though it may not be as obvious.

(iii) Terraced cultivation involves more soil working and preparation which people are not used to. The Department points out that the additional work is compensated by the higher yield. It adds that the real problem is the lack of familiarity with the implements used in settled cultivation.

(iv) Terrace cultivation means monocropping or the cultivation of two crops in rotation, therefore the food needs of the family are not fully satisfied. The Department accept this end as a transitional measure, mixed cropping as on Jhum fields is being encouraged.

(v) The importance of fertilisers and manures application are not realised by the farmers. The Department is taking up a programme to demonstrate the principles and techniques of applying plant nutriant.

(vi) The yields from the terraces is more with first and second year and thereafter it is reduced progressively. The Department feels that yields can be maintained after the soil is settled by fertiliser use and proper cultivation practices.

(vii) Since the land belongs mostly to the clan families under the management of the Nokma or Raj land belonging to the local raj, the farmer allottees of the developed land do not have a sence of ownership and responsibility. The Department points out that it has no direct say in this but that the concerned authorities like the District Councils are being pursued for taking up survey of the plot and investing the concerned farmers with ownership rights.

(viii) In some centres, villagers complain that in the process of division of the land they are sometimes given less suitable areas, the more influential persons keeping the better areas. The Department pleads inability on this matter as the distribution of land among village members lies within the jurisdiction of the village authority.

5.22 A scheme for Jhum Control and Watershed Management in Siang River Catchment in Arunachal Pradesh was sanctioned for implementation under NEC Programme during the year 1974-75. The basis objective of this scheme was to demonstrate to the people the benefits of permanent cultivation over shifting cultivation. It was also envisaged in the scheme to create permanent cultivation area to the extent of at least two hectares per family for agriculture and horticulture both according to the land capability classification. The scheme was divided into three composite units located in three different mini watersheds in the catchment area. The selection of units was done on the basis of the intensity of jhum cultivation in the area.

5.23 The area selected for treatment was surveyed properly and classified suitably on the basis of its soil survey and land capability classification. The availability of water for irrigation in the command area was also taken into account. The main components of the schemes were :

(a) Detailed survey and investigation,
(b) Land clearance,
(c) Construction of bench terraces,
(d) Contour bunding and strip cropping.
(e) Construction of irrigation system,
(f) Land levelling and shaping, and
(g) Horticultural plantation.

The work was undertaken by a composite team of workers in each unit under the Rural Works Department. The soil survey was done partially by the team of all India Land Use and Soil Survey Organisation. The construction of terraces was done partly by bulldozers and partly by maual labour depending on the location and accessibility. The irrigation systems were constructed and laid out after proper survey and investigation of the sources and alignment.

5.24 In view of the shortage of manual labour in Arunachal Pradesh, the scheme also provided for distribution of powertillers on 50% subsidy to those individuals, who wanted to own them after proper demonstration. Tractors were also deployed in the command areas on hire basis. The people showed excellent response to the use of this kind of machinery and labour saving device in the area.

5.25 As a result of concentrated efforts for five years from 1974-75 to 1978-79 during the 5th Five Year Plan, the following was the physical achievement of the scheme at a total cost of Rs. 115.00 lakhs.

(a) Total area brought under permanent cultivation.	2,250 hects.
(b) Area brought under irrigation.	1,170 hects.
(c) Area reclaimed by terracing contour bounding etc.	1,170 hects.
(d) Area brought under horticulture.	1,080 hects.
(e) Total number of families benefited.	1,125 families

5.26 Although a complete evaluation of the effects of this scheme on jhum cultivation has not been done, the Committee was given an assessment by Shri I. P. Gupta, formerly in Arunachal Pradesh. According to this assessment there was a very good impact on the cultivators of the entire catchment area with the result that jhum

cultivation has come down considerably. In certain areas of the project like Yingkiong people have almost abandoned Jhum cultivation. In Simong village the entire area has been transformed into a beautiful permanent paddy field, where at least two crops of paddy are taken round the year. Similar changes have been observed in Jomlo and Kaying areas of the project also. Not only that the farmers have taken to the permanent cultivation but the agricultural machinery like powertillers and tractors have also gained sufficient popularity in the area.

5.27 According to the evaluation, having experienced and observed the effect of this project, the farmers are coming forward with their own initiative to bring more areas under permanent cultivation, for which they only want the Government to provide irrigation facility, which is not within the means of the farmers. These areas have also started generating surplus foodgrains.

5.28 The cost of conversion to settled cultivation works out to about Rs. 10,000 for 2 ha., inclusive of minor irrigation. This is certainly not excessive since, for minor irrigation alone costs of Rs. 7000-8000/ha are considered acceptable. Minor irrigation is an accepted priority in our plans and it should be possible to lead the jhum control programmes from the minor irrigation side. The evaluation of the pilot project on jhum control taken up by the North Eastern Council and the jhum control programmes in Meghalaya and Arunachal Pradesh have brought out certain other important points which need to be taken into account in future programmes. The Committee would draw attention to certain other aspects which should also be taken into account in future programmes:—

(i) With the exception of the pilot schemes of the NEC, the jhum control programmes in the region do not seem to be based on the water shed approaches.

(ii) Though most programmes offer some support in addition to the assistance for land shaping and other land conservation measures, none of the programmes seem to have a truly comprehensive and integrated package of services for the jhumia;

(iii) The problem of weeds and pests may well be greater in settled cultivation than in jhum cultivation. The package of practices recommended for jhum agriculture will have to take this into account;

(iv) The food needs of the jhumia may not be met by the crops which would be taken up in settled cultivation and some dependence on outside sources for the same items will be there. The answer does not lie in undertaking settled cultivation with the same mix of crops as in jhuming but in a better public distribution system. The cropping pattern will have to be determined on the basis of productivity and economics.

5.29 The Committee also notes that the orientation of the measures taken up is basically towards jhum control i.e. to the conversion of jhum to settled agriculture rather than to jhum improvement. The latter is equally important but practically no work seems to have been done.

Suggested approach

5.30 The problem of jhum cultivation is so widespread that all the households involved in jhum cultivation cannot shift to settled cultivation even in a 5-10 years framework. Hence the strategy for jhum control must distinguish between different areas on the basis of the extent to which the jhum cycle has shortened and ecological problems have arisen. On the basis of field surveys jhum areas should be put into three categories :

(i) Areas where the cycle is still above say, 10 years and where ecological problems are not yet acute. In these areas the emphasis should be on improving the productivity of jhum through better agronomic practices and improved varieties;

(ii) Areas where the cycle has fallen below say 5 years and where ecological problems are already acute. These areas should be taken up on a priority basis for conversion to settled cultivation within a period of 10 years.

(iii) Other areas : These areas will probably face acute problems in the near future. Hence, in this case, the immediate measures may be for improving jhum but there should at the same time be a programme for the gradual introduction of settled cultivation. This programme may extend over a period of 20 years.

5.31 Each State/U.T. should examine the jhum cycle situation in each of its villages and identify the three classes of villages for necessary action. Having done this an annualised programme should be drawn up. The required finance may come from the provisions for jhum control, soil conservation, minor irrigation, IRD, etc.

5.32 Manipur and Tripura have proposed certain schemes for the upgradation of jhuming. In Tripura what has been proposed is the supply of composite mini kits of improved seeds, each mini kit contain a mixture of seeds for the crops to be cultivated by the jhum household. There is also a proposal to take up a programme of trial-cum-demonstration which will provide valuable information on jhuming. The Manipur scheme proposes to give incentives for improved agronomic practices in jhum lands on the following basis :

(i) Incentive for clear jungle clearances Rs. 150 per hect.

(ii) Incentive for removal of unburnt logs, stems, weeds etc. Rs. 100 per hect.

(iii) Incentive for cost of improved seeds, Rs. 200 per hect.

(iv) Incentive for line sowing and strip cropping across the slopes : Rs. 100 per hect.

(v) Plant protection measures: Rs. 50 per hect.

(vi) Incentive for sowing rabi crops : Rs. 400 per hect.

5.33 The initiative taken by Manipur and Tripura in undertaking a programme of improving is welcome. Whereas the Tripura scheme has a technical content which is necessary, the Manipur scheme proposes to subsidise operations which anyhow form a part of the jhuming cycle. The real answer lies not in cash incentives but in the extension of better technology and in the provision of infrastructure and some essential inputs.

5.34 The Committee notes that a fair amount of work in adaptative research and field trials will be necessary to identify effective measures. The manner in which cropping patterns have to be adapted to the terrain and climatic conditions in each micro area has to be determined. Improved varieties suitable for direct seeding have to be identified and introduced. The manner in which fertilizer should be applied so as to maximise benefits has to be identified. All this can only be done if there is some adaptative research on jhum cultivation in different areas from alternatives to jhuming in terms of settled agriculture. This particular aspect of agricultural research has not received sufficient attention so far and should be taken up on a priority basis by the ICAR Research Complex. The programme of trials-cum-demonstration of the sort proposed by Tripura would help to generate valuable data for such adaptative research and hence must be taken up immediately. This will be in the nature of an operations research programme. It is but proper that the ICAR Research Complex take up such an operations research programme in various sub regions. The establishment of extension machinery to reach jhum households can also be taken up immediately so that as soon as research results are available they can be transferred to the field. The Committee would emphasise that this programme of adaptative research and extension for jhum improvement is absolutely essential since even in the transitional period during which the bulk of the farming households in the region will continue to depend on jhuming and improvement in their economic conditions requires that, as an interim measure at least, the productivity of jhuming should be improved.

5.35 As far as conversion from jhum to settled cultivation is concerned, a variety of models for settled cultivation relevant for jhum areas are available :

(i) **Conservation to Plantation.**—This is the earliest of the proposed strategies, and involves a total shift to a plantation, crop like tea or rubber.

(ii) **Terraced cultivation.**—This being actively pursued in state sector schemes and is being implemented with and without irrigation.

(iii) **Conversion to grass lands.**—This is happening in certain areas where animal husbandry and dairying has developed.

(iv) **Three-tier System.**—This involves crop husbandry with bench terracing in the lowest third of the slope, horti-pastoral crops with half-moon terracing in the mid-portion and forestry in the top third.

5.36 The possible types of settled agriculture which could be taken up by the jhumia will depend on a variety of factors of which the most important is the physiography of the area. The three-tier model mentioned above involves an adaption of land use to physiography. The recommendation that the lowest third be used for agriculture, the middle third for horti-pastoral crops and the top third for forestry is only an approximation. The distribution of land-use between these three will really depend on the gradient. For instance, in Assam, the proposal is to take up terraced paddy cultivation in areas up to 5% slope, plantations interspersed with crops like pineapples in 6-30% slope and forestry above 30%. Apart from slopes, the other physical considerations which will have to be taken into account are the depth of top soil, rainfall and drainage conditions etc.

5.37 The relevance and usefulness of each of the models listed above also depends on certain factors. The first point worth noting is that the typical jhumia household is a subsistance agriculturist who grows food crops for its own consumption. These households cannot be expected to switch over completely to a plantation or pastoral system unless an elaborate marketing system for their produce and a distribution system for foodgrains is built up simultaneously. The second factor that is relevant is the low level of agricultural technology. Almost all the models described above involve techniques of cultivation that are now for jhumia. The degree of change varies between the models. Hence there will be a corresponding variation in the extent of extension support required. The third factor of relevance is the lack of labour both for the conversion operations as well as for the subsequent farming operations. As far as conversion operations are concerned the requirement is greatest for terraced cultivation and lowest for pastoral operations. As far as labour for farming operations are concerned, the requirements are highest for the plantation operation and lowest for pastoral system.

5.38 The principal criteria for the selection of a model in any local area must be the extent to which it raises productivity per unit of land and per manday of work. At present jhum cultivation yields a return of barely Rs. 2 to Rs. 2.50

per manday. Almost any version of settled agriculture will yield a higher return. However, the selection will be constrained by physical conditions, marketing prospects and the ease with which infrastructure can be developed. Subsistence requirements may also need to be protected. This should be done within the framework of productivity maximisation by upgradation of crop production technology even if the crop production is for home consumption.

5.39 The conversion of Jhum lands to settled cultivation, whatever be the model chosen, must also take account of the nature of the land tenure system. In Jhum area, individual households do not have any settled rights to Jhum lands. Control over those lands generally lies in the hands of a village council or a tribal chief. The area of control of the village as a whole is usually well-defined. The first problem that has to be tackled is that of giving the Jhumia a permanent, heritable and transferable title to some part of the Jhum land. This is necessary to provide the substantial amount of labour and investment that the conversion to settled agriculture will require. The fact that individual control over land under permanent/settled cultivation is accepted in the region suggests that this may not be difficult. The second problem that will have to be tackled is the fact that if other households in the villages continue with Jhum cultivation the Jhumia will be reluctant to surrender his rights to Jhum lands and will also be tempted to revert to Jhum cultivation particularly when he faces difficulties in settled agriculture. The third problem arises from the fact that settled agriculture requires less land than Jhum cultivation does. Thus, a proper use will have to be found for the Jhum lands under village control which will be surplus to agricultural requirements once settled cultivation is taken up.

5.40 It is necessary to approach the problem on a community basis. The attempt should be to persuade all households in a village to change over to settled cultivation. This can be done through the good office of the village council or the tribal chief. The authority controlling the distribution of land should give individual households permanent heritable and transferable rights over the land brought by them under settled cultivation. The balance of the village lands, which will now no longer be required for cultivation can be converted into a community forest under state government ownership or, if that is not feasible, under the control of the village council. Such a community approach will minimise the problems involved in moving from the existing system of land tenure to individual ownership.

5.41 One major difficulty in Jhum control operations is the lack of draught power for village. The farmers in the area are not familiar with ploughing operations, since these are not required in Jhum cultivation. If draught power is not provided there will be a tendency to cultivate terraced lands as if they are Jhum lands which would reduce greatly the benefits of settled cultivation. Therefore, it is necessary to provide the required draught power through power tillers and through a suitable reorientation of the animal husbandry system. The farmers will also have to be trained for ploughing operations. This training will have to be provided by the extension machinery which will have to be strengthened for this purpose.

5.42 The next important requirement is that the planning of Jhum land conversion must take place on a watershed basis. This has not always been done in existing programmes for jhum control. However, the ICAR's three-tier system is designed to fit in with this approach. The watershed approach which has been described more extensively in the National Committee's Report on the Development of Backward Hill Areas (Para 4.7 to 4.13) is important because only then can one of the objectives of Jhum control viz. reduction in run-off and soil erosion be achieved. It is also important because it will enable the design and provision of irrigation facilities which are vital for crop production in the newly terraced slopes. Watershed management calls for scientific survey and investigation of each watershed by a technical team. Since several hundred such investigations will be necessary, it is essential that technical capabilities for this purpose be built up quickly. As an interim measure a more approximate approach to watershed planning may be necessary. In practice people already do some watershed management and the experience and local knowledge can provide a basis for preparing a workable plan.

5.43 The implementation of Jhum control schemes has to be taken up on a projected basis so that all related investments comprising outlays on soil conservation, agriculture extension, input subsidies, infrastructure, etc. are covered in the plan. The responsibility for implementation may rest with the project authority even though the technical control may be exercised by the respective technical hierarchies. Attempts to integrate a large number of activities at watershed level should be checked. Since the basic land-uses agriculture, forests, grass lands and basic concern is to provide adequate return in terms of food, fooder, firewood, etc. the level of integration should be restricted to those line departments which are directly concerned. Other items like the improvement in logistic support should be taken care of at a much higher level, too many line departments should not be brought together, as that would create confusion.

5.44 The foundation of agricultural advance must rest on technological advance in terms of appropriate land use, improved varieties, better agronomic practices. This will require a strong research and adaptive research in agro-climatic zones.

5.45 The principal agriculture research organisation for the hill areas of the north-east is

the I.C.A.R. Research Complex for the North-East region which was established in 1975. The headquarters of the complex is located in Meghalaya where it has three research stations at upper Shillong (1790 m), Nayabanglow (800 m) and Burnihat (100 m). In addition, there are fairly large research centres located in Manipur, Nagaland, Tripura, Arunachal Pradesh and Sikkim. Further, it has another centre in the Karbi Anglong District of Assam under the administrative control of Assam Agricultural University. In order to work for the entire region, the research stations have been established at different altitudes. The region has been divided into three altitude ranges: (i) upto 800 m. (ii) 800 to 1300 m and (iii) above 1300 m. According to the ICAR Research Complex the entire region has been considered as one unit so as to avoid "duplication of research under similar altitudes in various state/union territories" so that the available research scientists could be rationally utilised to tackle a larger number of problems.

5.46 With regard to shifting cultivation the centre took up a multi disciplinary project to develop an alternative system of farming which would cause the "least disturbance to their socio-cultural life yet, which would help in halting the soil and fertility erosion as well as in improving production". The outcome of this research is a three-tier system as given in the table below :

TABLE 5.8

Land-use pattern for Hill slopes in the Alternative System to Replace Jhuming

Slope	Approx % of total area	Land-use	Conservation measures
Lower portion .	33·5	Agriculture	Bench terracing
Mid portion .	33·5	Horti-pastoral	Half-moon terracing for horti. cultural plants.
Top portion .	33·0	Forestry	

5.47 The advantages of this modified system as indicated by ICAR are :

(i) Productivity can be adequately increased in the 1/3rd terraced area and improved technology can be introduced.

(ii) Soil and fertility loss can be checked.

(iii) Subsidiary sources of income can be assured.

(iv) The 1/3rd terracing can be done by the family labourers of the Jhumia families.

(v) Developmental efforts of the Government will be greatly helped since three times more areas can be covered with the same amount of money since only 1/3rd of the area has to be terraced. This can also be done by giving some financial aid to the Jhumias.

(vi) Since horticultural crops will be grown, the farmer will have a long-term interest in the land and when round the year cropping with good yield can be obtained from the lower terraces, a gradual attitude for permanent settlement will be induced. Even the farmers may eventually like to terrace the other areas themselves.

(vii) The system will least interfere with their socio-cultural system. Initially, even burning of the 65-70% of the lower slopes of the hills can be allowed before developing the lower terraces.

5.48 The division of plant breeding has been working with as many as 17 crops. The major projects include (i) development of a suitable high yielding variety of rice with cold tolerance for high altitudes, (ii) development of a suitable composite variety of maize for high altitude, (iii) adaptive trials with different varieties of other crops at various altitudes to identify suitable improved varieties for upland and irrigated conditions including selection of varieties suited to mixed or multiple cropping and (iv) to collect and evaluate the indigenous germplasm of crops. The division has, so far, collected over 400 local varieties of rice, evaluated them and utilised them in about 30 cross combinations. Promising lines for cold tolerance are now in advanced generations. A local variety called 'Pawnbut' from Mizoram has been found to be early in maturity and very promising as upland rice for direct sowing under low fertility and moisture stress conditions. Besides developing suitable cropping patterns for upland terraces, varieties suited to multiple cropping and mixed cropping have been identified.

5.49 The ICAR Research Complex also has divisions dealing with soil science, agronomy, horticulture, entomology, plant pathology, agricultural engineering, animal nutrition, animal health, animal production, etc. The work done in these divisions and in the multi-disciplinary project referred to earlier has helped to develop a basic technology package for Jhum control. What is required now is adaptive research to tailor the package to the variety of conditions found in this area and an extension effort to deliver this package to the farmers.

5.50 Facilities for adaptive research under varying agroclimatic conditions seem to be lacking. As pointed out earlier the ICAR Research Complex is treating the region as one unit and differentiating its work only by three broad ranges of altitudes. However, there are other sources of variation in agricultural conditions besides altitude and a large number of research farms is necessary so as to cover each type of agro-climatic system found in the region. Since there may be some difficulty in doing this with the available scientific manpower in the region, this extension of research effort could be taken up on a phased basis. The responsibility for this localised adaptive research must be gradually passed on to the state governments.

5.51 Apart from research, the vital need in this area is for effective extension. The present position is rather difficult to assess since the staff are shown under many heads. However, the broad impression is that the extension machinery is inadequate for the tasks at hand. Unless the extension machinery is strengthened, research results cannot be transferred to the farmers. In this situation, soil conservation measures like terracing will not be effective as farmers will tend to cultivate the terraced yields in the same manner as the Jhum plots.

5.52 During the 6th Plan, all the State Plans have proposed a very substantial strengthening of the extension machinery. Some of the states (e.g. Nagaland, Tripura) propose to move over to T&V system for agricultural extension with some slight local variations. Jhum improvement as well as the conversion of Jhum to settled agriculture will require many important changes in cropping pattern and agronomic practices. Continuous technical guidance to the farmers will be required. It is, therefore, necessary that an effective extension system with at least one VLW per village, one extension officer per 8-10 VLWs and suitable complement of subject matter specialists at district and sub-divisional levels be established in all the hill areas of the region. Areawise priorities for strengthening of extension must be laid down on the basis of the proposed development programmes. The extension staff must be in a position one year earlier. The group must be multi-disciplinary as required for the water shed approach.

5.53 There must also be a linked programme of trials-*cum*-demonstration. The extension machinery and the system of demonstration will then provide a link between the farmer and the research workers in the ICAR Research Complex as well as in the State Governments. The NEC must have a cell for propagating the watershed management sub-approach. There must be a smooth movement from pilot schemes, of the sort that have been taken up so far, to demonstration projects and, based on the demonstrations, a training programme for the field level staff of the State Government.

6. HORTICULTURE

The north-eastern region is well-suited from the point of view of climate for horticultural and plantation products. Moreover tree crops can play an important role as an ecologically sound alternative to jhum cultivation.

6.2 The wide range of altitudes and climatic conditions in the north-east is reflected in the diversity of fruits grown in the region. They range from tropical and sub-tropical fruits like pineapple, banana, various citrus fruits and papaya to temperate fruits like apples and even certain nut trees. Coconut and arecanut also grows in the area. The cultivation of potatoes and tuber crops is fairly extensive. A large variety of tropical and temperate vegetables are grown. As for plantation crops tea is a major crop in Assam and of late other plantation crops like rubber and coffee have also been taken up. Medicinal and aromatic oil yielding plants like Idronella have been considered suitable for certain areas in region.

Fruits

6.3 The available data on the area under different fruit crops and production as of 1978-79 are presented in Annexure 6.1. As these data show the principal fruit crops, in terms of area and production, are banana, pineapple and citrus. Apples are an important fruit crop in Arunachal Pradesh.

6.4 Banana is grown both in the plains and the hills. In the plains it tends to be backyard crop and in the hills it covers large untended tracks which soon become 'banana forests'.

6.5 Pineapple is grown in this region generally under rainfed conditions, often along the slope in hilly areas and with practically no use of fertilisers or plant protection measures. Hence average yields are very low (about 8 tonnes/ha.) compared to other parts of the country (about 40 to 60 tonnes/ha.).

6.6 The north-eastern region is one of three major centres of diversity in citrus in the country. Mandarin orange the most prominent variety being the khasi mandarin is the principal citrus fruit. The principal problem at present is that of rapidly declining productivity. This stage is only partly attributable to "citrus decline", a problem associated with virus.

6.7 The ICAR Research Complex for the north-east has a horticulture division which so far has taken up research on citrus, pineapples and temperate fruits (apple, plum, pear and peach). Considering the existing research gap and the available resources, the following areas of research were given priority in developing research projects at various centres of the Research Complex.

(i) Survey of different horticultural crops, collection and evaluation of local germplasm.

(ii) Identification of causes of mandarin orange decline and development of suitable remedial measures.

(iii) Identification of high yielding and promising varieties of fruits, vegetables, tuber crops, rhizomatous crops, plantation crops, flowers and medicinal and aromatic plants for different agro-climatic zones of the region.

(iv) Development of suitable agro-techniques for maximisation of seed production of various horticultural crops including seed production technology.

(v) Post harvest technology for storage and processing of various horticultural produce.

6.8 The declining productivity of citrus has been studied in detail by the ICAR and their findings are as follows:

"General neglect, mixed planting, undesirable intercropping, improper spacing, vigorous weed growth, inadequate nutrition, particularly certain micro-nutrients, infection of Phytophthora root-rot, gummosis, powdery mildew, canker and scab diseases as well as infestation by insect pests like borers, aphids, scales, mites and leaf minor etc. are major contributing factors for the decline in the entire N.E. region. Leaf analysis have indicated that there is deficiency of Calcium and excess of Iron. Indexing for greening (mycoplasma) disease through chromatographic technique covering 18 species of citrus spread over major citrus growing belts of Meghalaya has confirmed the presence of the disease in most species and varieties. However, only 3 per cent of the seedling origin Khasi mandarin trees showed positive symptoms of the disease, thus indicating that greening disease is not a major contributing factor for mandarin orange decline in Meghalaya".

6.9 The ICAR has now identified a programme of action for the rejuventation of declining orchards. Pilot-*cum*-demonstration trials of mandarin orange on four recommended rootstocks have been laid out in Meghalaya, Nagaland, Mizoram and Manipur in collaboration with the Indian Institute of Horticultural Research, Bangalore and the Department of Agriculture of respective states for ascertaining suitability of different stock-section combinations under local

agroclimatic conditions. Healthy and very highly productive donor trees have been identified in declining orchards of Meghalaya for bud-wood source of Khasi mandarin. About 70 different types of citrus have been collected in the region and are being studied for further economic exploitation.

6.10 Pineapple is grown purely as a rainfed crop in slopes of varying gradients and in the plains. In most areas it occupies the land for 12 to 20 years under continuous ratooning. Planting is generally done at wider distances down the slopes to facilitate quick drainage of rainwater and easy weeding operations. The ICAR's Complex has concentrated on agronomic aspects. Their trials on optimum plant population suggest that the density of planting can be increased from the present average of about 10 thousand plants/ha. to about 50 thousand plants/ha. on a 34% slope. The yield in the ICAR trials was 74 tonnes within 19 months of planting and 84 tonnes within 24 months. High density planting also reduced soil loss considerably. Experiments on prolonging the harvesting period, conservation of moisture and weed control are in progress. With regard to weed control the cultivation of a leguminus inter-crop like rice beam in the first year of planting was found to be feasible and showed good effects in arresting weed growth in Tripura.

6.11 With regard to temperate fruits the ICAR complex has concentrated mainly on the identification of suitable varieties. Apple cultivation has spread in the Kameng district of Arunachal Pradesh and an ICAR survey indicated yields as high as 80-100 kg/tree even in 17-20 year old trees. Upto 1979-80, 5 lakh grafts have been planted in Arunachal Pradesh and 50 thousand trees are already at the bearing stage.

6.12 Research on the identification of suitable cultivation and appropriate agronomic practices has to be accompanied by the provision of planting material and effective extension support. There are 72 nurseries in the region for the multiplication of fruit plants set up by State Governments (other than Assam). However, except in the case of mandarin, the production of plants is much less than demand. Hence in most of the states the annual demand of fruit plants for distribution in the blocks/villages is met from wholesale purchase by departments from private sources within and outside the region. This carries with it the risk of introducing unsuitable varieties and of importing diseases from other areas. Extension support is inadequate and there is hardly any follow up after the distribution of material. Because of this there is heavy mortality of plants and those that survive assume a wild form due to the lack of training of plants leading low productivity ultimately.

Suggested Approach

6.13 From an examination of the situation of fruit cultivation in the North East, at present, and comparing it with the altitudes and climates available in the different states, it would appear that many fruits which can be grown in a particular area are not being cultivated, e.g. apples in Nagaland and Meghalaya. With a few exceptions of apple cultivation in Arunachal Pradesh, horticulture, development in the region seems to be restricted to marginal improvements in areas where fruits like pineapples and citrus have been grown for a long time. Though there are a large number of schemes for extending horticulture the actual impact in most cases is limited. Hence a more aggressive programme of horticultural development is required. This will involve not merely paying attention to existing orchards but new developments. Cultivars from other areas in India in similar conditions have to be identified for different parts of the region. Bare areas in forest may also be suitable for intensive horticulture development. Besides, new fruits grown in similar conditions elsewhere can also be promoted, e.g. chickoo, durain, mangousten.

6.14The identification of suitable cultivars is a painstaking process since the evaluation of suitability cannot be made until cultivars have been tried out. One implication of this fact is that the possibility of taking up development cannot be based merely on the experience of the cultivars/plants which are to be found at present in the area. For example, the possibility of apple cultivation in Nagaland and Meghalaya has been discounted because of the assessment that the yield and the fruit quality that has been observed so far is rather poor. In such a situation research should continue to identify other varieties which may be more suitable since the basic conditions in the high altitude region of these states appear to be suitable for apple cultivation. The poor yield at present may only be on account of the fact that the cultivars/plants observed or the agronomy practices may be of poor quality. Thus horticultural research has to be aggressive and continue to look for suitable varieties of topographical and climatological conditions indicate that a particular fruit can be grown.

6.15 With regard to citrus, the major problem of citrus decline appears to have arisen from the neglect of orchards resulting ultimately in infestation of trees with philoptera and stem-borer. The prime task therefore is rejenuvation of these orchards, is recommended by ICAR. In many cases this can be done just by cleaning and pruning of trees and the addition of NPK and micro-nutrients. In other cases budwood/rootstock from healthy and productive donor trees would have to be supplied. This will require a survey of existing orchards and the diagnosis of the problem hill by hill and the recommendation of appropriate remedial measures. As pointed out earlier, the required research has been taken up by the ICAR

Complex. What is required now is the extension of the ICAR's research results to the field. This will require an extension machinery which is effectively linked to the research complex. This link at present stage of development may have to be provided by the NEC which should have a top level citrus expert on its staff, whose job will be to carry over established technologies to the various states where citrus development is possible. The relevant horticultural wings of states will need strengthening.

6.16 In the case of pine-apple, the root stock used appears to be good and it has been taken for use in the rest of India. A great deal of extension work on close planting so as to improve yield has been done and yet the spread of the technology has been limited. The reasons for this are not readily available but one reason could be that the return from pineapple cultivation is not very high. Fresh pineapple has a limited market and therefore processing is necessary. However, it would appear that the existing processing units for pineapple in the North East are not very profitable. One reason for this is the difficulty in the collection of the pineapple by centralised processing units. If this is the case then the situation may be improved by multi-stage processing in which pineapple is crushed in the producing area in small plants and the crushed material is moved to some centralised concentrating and processing plant. Such an approach would also increase the value added accruing to the producing area. It would be desirable if the economics of alternative processing schemes for pineapple are studied carefully by the NEC.

6.17 The extension of horticulture in some parts of the North East will meet with some difficulties of transportation. In remote areas which are difficult of access, it may be possible to pursue the cultivation of nut trees, since in these the problem of deterioration of the fruit in transit does not arise. Grafted walnut appear to have done well in Arunachal Pradesh and a similar approach may work in other remote areas. The converse of this is that the extension of fruits which can deteriorate rapidly e.g. peaches and plums should only be taken up near markets and processing facilities.

6.18 The foundation of effective horticulture development is the availability of suitable cultivars. The nurseries in this region are producing plant materials but it is not at all clear that what is being produced is appropriate for the conditions in different parts of the region. It would be useful to undertake a survey of the material that has been distributed to see what has worked. Alongwith the process of identification of suitable cultivars, nurseries should be expanded to meet local demand so as to reduce the need to rely on purchase of planting material of doubtful quality from trade sources.

6.19 The extension machinery for horticulture in most parts of the region is weak. The horticulture wing of the agriculture department is poorly staffed and often in some of the states it does not have more than half a dozen technical staff. Horticulture is an important activity in this region since it can offer a remunerative alternative to jhum cultivation. Given the required scale of operations, the horticulture wing of the Agriculture Department will require substantial strengthening in all states. The extension effort will have to cover not merely the provision of planning material and subsidies but also expert advice on plant protection and the maintenance of orchards. Moreover some arrangements for adaptive research and data collection at state level will be necessary to provide a link between the regional facilities like ICAR Research Complex and the extension machinery.

6.20 The upgradation of horticulture, in this region will have to be accompanied by effective marketing arrangements. Most of the produce is sold directly to traders in the village market and the price realised by the producer is but a fraction of the final selling price. The few processing units in the region also use middlemen so that producer has little incentive. In the case of orange a NEC paper indicates the following differentials:

Along area of Arunachal Pradesh	Rs. 5 per 100
Garo hills	Rs. 10 per 100
Southern Slopes of Khas hills	Rs. 21 per 100
Shillong city	Rs. 31 per 100

The price that the producer gets is limited and much of the final price is collected by the trader.

6.21 The problems of marketing are further compounded by the limited fruit processing capacity in the region. The 30 or so processing units in the region can handle only 3000 tonnes per annum though actual utilisation of capacity is only around 1000-1500 tonnes per annum. What is required is an integrated structure of marketing and processing starting from some arrangements for primary collection (say through cooperatives), processing, storage, and at the apex. an organisation that can undertake marketing outside the region in national and international markets. A beginning has been made in this direction by the establishment of a North-Eastern Regional Agricultural Marketing Corporation (NERAMAC). However, this Corporation cannot be effective unless steps are simultaneously taken to establish suitable marketing arrangements at local level. It will also be necessary to invest in processing facilities to absorb seasonal surpluses and ensure a reasonable return to the growers. Processing units may not be economic unless it takes up several horticultural products because of seasonality problems. All horticultural growers in the area can be brought within cooperative fold and linked to the processing unit. The possibility of introducing the two or three tree tier pattern

for cooperativisation of growers and linking them with direct or regional level processing and marketing facilities may be worth examining. This may be done by the NEC.

6.22 The processing and storage operations will have to be designed on the basis of the specific requirements of the region. The possibility of fero stage processing of pineapple has been mentioned earlier. The climate of the region can also be used to advantage by having cool houses for cold storage in the higher altitudes and solar driers for drying fruit.

Vegetables

6.23 The available information on the production of vegetables crops in the region is given in Annexure 6.2. Apart from the production reported in this annexure, there is a substantial amount of vegetable production, even in the jhum cultivation, for home consumption. This production is not reflected in the data given in the annexure.

6.24 From the commercial point of view the most important vegetable crop is potatoes. In Assam and Tripura it is grown mainly as a rabi crop whereas in the Shillong plateau, where potato cultivation is quite old, two crops are taken. Freedom from aphids, deep and rich soil, moderate climate and fairly well distributed rainfall make potato a promising crop for the hill areas of the north east.

6.25 The ICAR Research Complex has not taken up any extensive work on potato cultivation. However, because potato cultivation is highly commercialised, growers have taken to improved varieties, the present coverage under improved varieties in the Shillong plateau being about 20 per cent of the growth area yields of 28 tonnes/ha. for the summer crop and 11 tonnes/ha. for the autumn crop have been recorded in this area. These yields compare well with all-India level. Potato cultivation is now being extended to other hill areas in the region. The potato crop in this region comes earlier than from anywhere else in India. Thus it has to compete with cold storage potatoes in the early season and has a price advantage. However, this particular aspect of potato marketing needs to be studied in greater detail by the NEC or NERAMAC. The Centre's Potato Research Institute must have a station in north east to develop early season potato for better storage and transport. This extension of area under potato needs to be pursued along with related investments in cold storage and marketing. This latter aspect of processing and marketing can be taken up by the Regional Agricultural Marketing Corporation.

6.26 Ginger and turmeric play a role even in jhum cultivation. The turmeric from this region is particularly noted for its quality. An analysis of the local variety in Meghalaya showed a dry matter recovery of 20 per cent and curcumin content of 6 to 6.5 per cent which is much above the standard laid down for export markets. This suggests that it could be profitable to spread turmeric cultivation systematically in the region providing proper facilities are established for collecting, curing and marketing of the produce. Ginger production can be stepped up if facilities for preservation and dehydration of ginger are set up.

6.27 The ICAR Research Complex has made various selection trials for many vegetable crops under different agro-climatic conditions. They have emphasised off season production in order to give a better economic return. Seed production for cauli-flower and radish has also been attempted. Vegetable seed production for national markets may be feasible even in the near future. The National Seeds Corporation should investigate the possibility of seed production in the area for the Indian Market.

6.28 Large scale extension of vegetable production will depend entirely on the establishment of effective processing and marketing arrangements. This should be pursued since many of the hill vegetables can be produced in what is the off season in the plains. However, this establishment of effective processing and marketing arrangements will take time. Hence, at present, the emphasis has to be on improving productivity in existing areas under these crops.

Floriculture

6.29 The zone comprising Eastern Himalaya and North-East India is one of the unique floristic region of the world. It is phytogeographically linked with the mountain tropical flora of Indo-Malaysia and the temperate flora of Eastern Tibet, Sino-Burma and N.E. Area. The diversity of habitat and climatic conditions have supported a very rich flora in this region. Quite a few of the best known plants of the temperate gardens of the world were introduced from this region. Plantegenera like *Rhododenron, Primula, Gentiara, Berberis, Acer, Medanopsis, Magnolia, Viburnum, Pedicularis, Epilobuim, Aimpations Buddleia, Iris* and over 700 species of archids have supported a multimillion dollar horticulture industry in United Kingdom, USA and Europe.

6.30 So far we have not been able to utilise this fabulous floral wealth for the benefit of the local people. Therefore development of floriculture should be kept in view for generating new type of remunerative economic enterprise for the people. It would necessitate setting up of a floriculture development centre to undertake extensive surveys to locate plant species of high floriculture value and propagate the selected species for commercial purposes. The new tools of tissue culture and breeding can help to quicken the pace of work in this field. A joint unit of the Botanical Survey and the ICAR Research Complex should be located in this region.

ANNEXURE 6.1

Area and production—Fruit crops

A=Area in '000 hectares
P=Production in '000 tonnes

State/UT		Pine-apple	Orange	Other citrus	Banana	Apple	Pear	Fruits	Papaya	Mango	Guave	Coco-nut*	Total
Arunachal Pradesh	A	0·256	1·667	..	..	2.312	0·125	0·325	..	..	..	..	4·665
	P	2·048	1.719	..	..	6·726	0·681	1·904	..	..	..	..	13·078
Assam	A	3·40	2·00	1·10	20·00	..	..	..	2·48	..	..	5.0	25·98
	P	34·00	17·00	9·00	260·00	..	..	..	40·80	..	..	31·0	60·8
Manipur @	A	6·02	4·00	2·00	2·30	..	1·60	0·40	0·2	0·1	1·0	..	23·82
	P	75·3	28·00	15·00	7·50	..	10·00	4·25	2·4	0·4	5.0	..	147·85
Meghalaya@	A	7·30	4·80	1·60	2·875	..	0·30	0·31	..	..	..		17·185
	P	43·00	28·00	9·40	39·327	..	1·85	1·25	..	..	..	..	123·027
Mizoram	A	0·21	0·28	..	0·9	..	..	..	0·69	..	..	..	2·18
	P	1·56	1·73	..	2·4	..	..	..	1·82	..	..	..	7·51
Nagaland	A	0·11	0·36	..	..	..	..	..	..	..	..	..	0·47
	P	1·61	1·20	..	..	..	..	..	..	..	..	..	2·81
Tripura	A	2·83	1·21	..	2·8	..	..	..	0·30	..	..	0·8	7·14
	P	10·00	8·50	..	18·0	..	..	..	2·26	..	..	1·1	38·76
TOTAL	A	20·126	14·417	4·70	35·075	2·312	2·025	1·015	3·67	0·1	1·00	5·8	84·44
	P	167·518	86·349	33·49	327·227	6·726	12·531	7·404	47·28	0·4	5·00	32·1	693·835
Average Yield per hectare		8·32	5·90	7·10	9·33	2·91	6·18	7·20	12·88	4·0	5·00	5·53	8·21

Source : @ —Papers presented by State Departments for Horticultural Development Council Meeting held in October, 1979.

Others: Basic Statistics—1979, North-Eastern Council, Shillong.

*Production in million number.

ANNEXURE 6.2

Area and production—Vegetable crops

A=Area in '000 hectares
P=Production in '000 tonnes

State/ UT.		Potato		Turmeric	Ginger	Tapioca	Sweet potato	Chillies
		Hill	Plain					
Arunachal Pradesh	A	0·1	..	..	0·26	..	..	..
	P	0·7	..	..	1·25	..	..	..
Assam	A	..	33·3	6·1	5·00	1·3	8·4	10·4
	P	..	135·6	3·6	1·45	5·4	28·2	6·2
Manipur	A	1·5	..	..	1·5	..	..	2·6
	P	6·4	..	..	1·8	..	..	1·6
Meghalaya	A	17·6	..	1·3	2·1	2·0	3·8	1·2
	P	80·8	..	1·2	8·9	10·9	12·6	0·8
Mizoram	A	0·5	..	0·1	4·0	0·1	..	3·8
	P	1·2	..	0·1	8·1	0·2	..	0·9
Nagaland	A	3·7	..	..	0·4	..	0·3	1·4
	P	20·0	..	..	1·69	..	0·8	1·0
Tripura	A	..	2·1	0·9	..	0·2	1·5	1·0
	P	..	26·0	1·1	..	0·16	13·1	0·4
TOTAL	A	23·4	35·4	8·4	13·26	3·6	14·0	20·4
	P	109·1	161·6	6·0	23·19	17·2	54·7	10·9
Average yield /ha		4·66	4·50	0·73	1·85	4·77	3·91	0·53

Source : 'Basic Statistics—1979' North-Eastern Council, Shillong.

7. PLANTATIONS

The development of plantation crops has been given a special place in the development strategy for the north-eastern region, particularly the hill areas. This is because this area offers great promise for crops like tea, coffee and rubber and also because these tree crops are an ecologically sound alternative to jhum cultivation.

7.2 With the exception of tea, plantation crops are not widely grown in the region. Tea is found only in Assam and Tripura where the area under tea plantations as of 1979 was 195 thousand hectares and 58 thousand hectares respectively. The plantation of coffee and rubber has been taken but the coverage as of now is very limited, the present planted area being about 2000 hectares for coffee and 4200 hectares for rubber. Present plants and the facilities available in the region for extension of tea, coffee and rubber are dealt with below.

Tea

7.3 Preliminary surveys in Arunachal Pradesh have revealed the suitability of certain areas for tea plantation. If intensive surveys are undertaken, a number of other promising areas would emerge which would lend themselves to tea culture on a commercial scale. Tea Board has already registered the Chansc Prange Tea Estate in Manipur to undertake tea culture in an area of 2000 acres in Manipur. The State Government in Meghalaya have already initiated certain concrete measures for laying out varietal trials of seeds and cloves. Measures are also underway to develop and improve infrastructure around the areas suited for tea culture. The soil and other related conditions are favourable for tea cultivation in Mizoram too. This has been established by the Preliminary survey conducted by the Tea Board some time back. Parts of Nagaland also hold considerable promise in this direction.

7.4 According to survey carried out by the Tea Board and others, it is estimated that the States/UTs can plant out the following areas.

State/UT	Scope by 2000 AD (000 ha)
Arunachal Pradesh	10
Assam	40
Manipur	10
Meghalaya	2
Mizoram	3
Nagaland	5
Tripura	2
	72

7.5 A series of promotional measures will have to be undertaken in all these non-traditional areas before tea cultivation starts on a reasonable scale. Most of these nurseries will have to be set up which would provide the basic planting materials. A number of Demonstration plots at suitable points will have to be raised for the benefit of the local planters. As tea cultivation involves a long gestation period, schemes will have to be evolved for providing fiscal and monetary incentives. Interest burden on loan may have to be cushioned in the first few years by evolving a suitable scheme of subsidy. Concessions could also be made available to these non-traditional areas in the first few years on excise duty. All these non-traditional areas will have to be nursed very carefully during the Sixth Five Year Plan so that the commercial feasibility of tea cultivation can be established in the long run.

7.6 The initiative for action has to come from the State Governments. The Tea Board can only provide assistance when this initiative is forthcoming. In most of the States discussions with the Tea Board or with private parties have started. In Meghalaya and Nagaland trial plots have already been laid out to establish the feasibility of tea cultivation.

Coffee

7.7 Coffee was introduced in the North Eastern Region around 1954 as a measure to prevent jhuming and consequent soil erosion initial growth and performance in the experimental gardens encouraged the expansion of coffee in different parts of the hill districts in the States of the North Eastern Region. The present areas under coffee in the region is around 2000 ha.

7.8 The details of the present area under coffee is furnished below:

Assam	1,148	hectares
Arunachal Pradesh	29	,,
Manipur	142	,,
Meghalaya	198	,,
Mizoram	147	,,
Nagaland	300	,,
Tripura	26	,,
	1,990	hectares

7.9 Experimental planting undertaken in the North Eastern Region under varying soil climatic conditions have indicated that coffee would be successfully cultivated in the hilly regions of all the states and Union Territories in the North-East. The perspective plan for coffee development has indicated that an area of 44,000 ha. could be brought under coffee by

2000 A.D. The area proposed for expansion is furnished below:

State/UT	Area considered suitable	Proposed coverage by 2000 AD
Arunachal Pradesh	Khonaza in Tirap Distt.	4,000 ha.
Assam	Karbi Anglong and North Chachhar Districts.	16,000 ha.
Manipur	*Churchandpur and Imphal	4,000 ha.
Meghalaya	Khasi and Jaintia hills	8,000 ha.
Mizoram	*Kolasit, *Bakhawthir and *Vairengle.	4,000 ha.
Nagaland	Kohima, Mokokchung, Thensanglish.	4,000 ha.
Tripura	Jolaibari, Peratia, Sepahizohila.	4,000 ha.
		44,000 ha.

7.10 As coffee is being introduced as a commercial crop, it is essential that adequate technical support is provided to the various state governments and agencies implementing the programme. The Coffee Board, with the concurrence of the Planning Commission has already taken necessary advance action to provide technical support in the North-Eastern Region. They have already started a training programme for workers, posted extension officers in the region, opened Coffee Demonstration Farms and seed multiplication units. Experts of the Coffee Board are periodically visiting the region to provide necessary guidance. As an incentive for expansion programme, the Coffee Board has introduced from 1979-80, an expansion subsidy of Rs. 2500 per hectare.

7.11 The North Eastern Council is also providing balancing facilities like coffee seedling nurseries at a cost of Rs. 99 lakhs, shade tree seedling nurseries at a cost of Rs. 28 lakhs, survey of suitable land at a cost of Rs. 21 lakhs, establishment of a model coffee processing unit with an investment of Rs. 21 lakhs and conducting training programme in the Assam Agricultural University.

Rubber

7.12 Rubber was introduced in the North Eastern Region in 1955 and was found to be suitable. Detailed surveys were undertaken between 1963 and 1965 by the Rubber Board which revealed that Assam and Tripura hold good prospects for development of rubber plantations. The present planted area in the North Eastern Region is about 4200 ha. with about 200 ha. having reached production level. Tripura Government has started a project to plant 5000 ha. through the Forest Development Corporation from 1976-77 to 1985-86 and has already brought 2662 ha. under rubber so far. With about 129 ha. under private ownership, the total area in Tripura is around 2800 ha. The Assam plantation Corporation has already planted about 450 ha. with rubber, with a target area of 3900 ha. by 1984. Meghalaya has 800 ha. under rubber with a target of area of 1200 ha. for VI Plan. Other State Governments like Arunachal Pradesh, Manipur, Nagaland and Mizoram also intend to take up small scale rubber plantations in their states in lower altitudes.

7.13 Taking into consideration the latest study (1980) by the Rubber Board, minimum area of 1,05,000 hectares could be brought under rubber by the turn of the century. The major scope for expansion would be in Assam (50,000 ha.) and Tripura (30,000 ha.) with around 25,000 ha. in the rest of the States/UTs.

7.14 The States of Assam and Tripura have deputed officers of the concerned corporations and Government Departments for training with the Rubber Board. The Board has established a Regional Research Station and a regional office in Tripura and is collaborating with Assam Agricultural University at Jorhat in field experiments. The Board has a programme for supply of high-yielding planting material and support to small holders. The NEC on its part is financing rubber nurseries in Assam and Tripura.

Suggested Approach

7.15 It is clear that the expansion of tea, coffee and rubber in new areas in the north-east is not taking place at a pace that would lead anywhere near the proposed targets. The extension of the cultivation into new areas has hardly begun. In the case of coffee and rubber barely 5 per cent of the identified potential has been realised. At this rate of progress the perspective targets for 2000 AD are clearly unattainable. Hence analysis of the constraints limiting plantation development need to be identified and remedial measures taken.

7.16 An important constraint on the expansion of plantations is the labour intensive nature of the activity. The history of Assam plantations shows that the bulk of the labour for plantations came from outside. Even though plantation wages are high one question that arises whether these wages would attract enough for local labour in hills areas where availability of labour is even lower than in Assam and where local wages are already high.

7.17 Roughly speaking employment per hectare of plantation is around 2.5. The proposed perspective targets for the hill states of the region (i.e. excluding Assam and Tripura) amount to 79 thousand hectares. This would need nearly 2 lakh workers on a permanent basis which may be compared with the fact that according to the 1971 Census these states had a total of 15 lakh workers in all. The comparison suggests that plantation development would require the diversion of workers from other agricultural

activities. This would be facilitated if plantation development is linked with jhum control. For jhumiya the shift to plantations would certainly give a return far higher than the Rs. 2 to Rs. 2.50 per day that he earns from jhuming. Such an approach is also necessary if local fears that plantation development will lead to large scale immigration are to be removed.

7.18 The national policy on plantation development emphasises the role of the small holder. The key ingredients in the small holder approach are as follows:—

(i) A source for high quality planting material,

(ii) Research and extension support,

(iii) Subsidies on capital and operating costs to cover the gap till the trees yield a return,

(iv) Common processing facilities for a group of small holders, and

(v) Marketing support.

In the case of tea, coffee and rubber there are existing plan schemes for this purpose. In some cases the scheme may have to be modified to suit conditions in the north-east. The main requirement, however, is the vigorous pursuit of available schemes in the areas already identified as having substantial potential for development.

7.19 The plantation development programme in this region also can be based on the small holder approach. Compact areas can be taken up for development by corporation with each individual family being given the right to about 2 acres. A family with 2 adults can full time manage only about 2 acres. In the first stage the compact area would be developed by the corporation with individuals being employed as labourers. Once the plantations reach the bearing stage the management would rest with the individual family who would have access to common facilities and technical advice from the corporation which would also take on the responsibility for marketing. The individual family would have the right of *usufruct* but would not have the right to alienate the land or convert it to some other use. This will require the development of a special patta. The processing facilities required would be provided for one or more of these compact areas.

7.20 Such an approach has already been accepted and tried out by the Assam Plantation Development Corporation. The approach has also been accepted by the other states in the region. The small holder approach is well established in the case of coffee and rubber where the commodity boards play an important role in the extension of the area. However, in the case of tea, the arrangements are less well established even though there are small holders in the south who have been cooperativised.

7.21 The Planning Commission advised the various states that in view of the special land tenure system existing in the region, the expansion of coffee may be undertaken through public sector corporations. The Government could then invest in the equity capital of such corporations and approach financial institutions for loans to implement the scheme. Such corporations would also be able to obtain necessary technical know-how as coffee being a new introduction, the farmers may not be able to get the same efficiently. It was proposed that land may be identified for each of the tribal family and the corporation may transfer the same to the family after the production may reach economic level. The farmers in the meantime are to be employed as workers on the plantation. This would enable them to acquire the requisite knowledge of growing coffee before the same is cultivated on their own. Subsequently, such corporations could operate as service agencies to provide input service to the tribals.

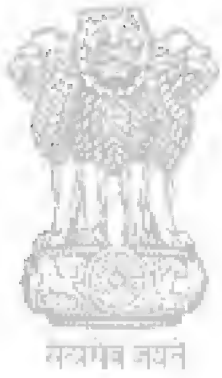
7.22 The Rubber Board has also suggested a similar approach in the case of rubber. The Working Group on Rubber for the Sixth Plan suggested as follows.

"Block planting programmes on the pattern of the Federal Land Development Authority (FELDA) of Malaysia in which the authority develops large blocks of plantation to the stage of maturity and subsequently divides and distributes it among educated landless and unemployed persons in small units of economic-sized plantations, could also be a worthwhile proposition towards solving unemployment, proper land utilisation, control of shifting cultivation etc. The workers to be engaged in the initial development of such block plantations should be the subsequent beneficiaries of the resettlement scheme. In order to make the scheme operate smoothly in advance, before the clearing and planting operations commence and they should be engaged as wage-earners until the stage when the parcels of the plantation would be distributed amongst them. The successful implementation of the scheme would involve creation of common facilities such as township, group processing factories and marketing organisation etc. The current efforts of the Assam Plantation Crops Development Corporation Ltd. for raising a 3,900 hectares rubber and 4,000 hectares coffee plantation in the hill districts of Assam for the benefit of the local 'jhumiyas' (Shifting cultivators) is a pioneering venture in this regard in India".

7.23. The District Councils can play an important role in plantation development by organising the extension of plantation area on their lands. They can form cooperatives and can give rights to individuals as has been suggested above in the case of corporations. However, district councils will not have the required technical or marketing expertise and even in these areas the corporation will have to be involved as a covering organisation.

7.24 Though the emphasis has to be on the development of plantations in compact areas to ensure an economy in the provision of technical services and processing facilities, the development of plantation on individual holdings cannot be ruled out. In such cases, the official machinery should accept the responsibility of providing technical support and planting material but the basic responsibility would rest with the individual. This is what the Coffee and Rubber Boards are doing in South India.

7.25 The expansion of plantation activity in this region would have to be fairly rapid if the perspective targets mentioned earlier are to be achieved. The achievement of these targets is desirable, both from the point of view of the region as well as the national need for additional supplies of plantation products. Rapid development will require an effective coordination machinery at state level and the responsibility for plantation development must be clearly assigned to a particular department. The approach to plantation development outlined earlier will also require the establishment of a corporation in most cases. In many of the States, this has already been done. In order to support the States, the NEC in its organisation should have a technical and managerial group to assist the State Department responsible for plantations as well as the plantation corporations. Coffee, Tea and Rubber Boards should have extension arrangements in the region.



8. FORESTRY

The National Committee has dealt in detail with the problems of Forest Policy in Hill Areas and Tribal Areas in its report on the subject (Refer Chapter 5 of Report on the Development of Backward Hill Area, NCDBA and Chapter 6 of Report on Tribal Areas Development, NCDBA). The north-eastern region is very well endowed with forest resources. Of the total geographical area of 25.5 million hectares about 12.5 million hectares are under forests. The details of the areas under forests are given in Annexure 8.1. The percentage of area under forests varies and the figures for individual States are as follows:

State	Percentage of area under forest	Percentge in regional total
1. Arunachal Pradesh	61·7	41·2
2. Assam	36·4	22·9
3. Manipur	67·8	12·1
4. Meghalaya	38·9	6·8
5. Mizoram	58·0	9·8
6. Nagaland	17·4	2·3
7. Tripura	57·4	4·8
8. North-Eastern Region	49.0	100·00

As this table shows three-fourths of the forest resources of the region are concentrated in three of the seven constituent units. The general picture of abundant forest resources also conceals substantial variations and there are states like Nagaland where the area under forests is quite low considering the topography.

8.2 A substantial proportion of the forest resources of the region are outside the reserved and protected category and are shown as district/village council forests or as unclassified. The percentages of forest area outside the protected reserved category in the different constituent units was as follows:

State/United Territory	Percentage of forest area outside reserved/protected category
1. Arunachal Pradesh	78·4
2. Assam	42·6
3. Manipur	63·4
4. Meghalaya	90·5
5. Mizoram	41·7
6. Nagaland	72·0
7. Tripura	Nil

Thus very substantial proportion of forest lands in all the units other than Tripura are effectively outside the control of the Forest Departments.

8.3 All the States in the region have taken up forestry development plans. Under production forestry the emphasis has been on quick growing species as well as on economic plantations. Programmes of social forestry and farm forestry have also been taken up. However, the area covered by the above programmes in relation to the extent of forest land that needs to be covered is not very substantial.

8.4 The paucity of data on the forests wealth in the region and the extent to which it can be utilised/exploited or developed is being made good by the pre-investment survey of forest resources being taken up by the Ministry of Agriculture and Irrigation. These surveys are designed to assess the present status of forests, their potential for development and also the possibilities of development of forest based industries in the region. Survey of the entire forest area in Manipur, Meghalaya and Tripura has already been undertaken. In other units like Assam, Nagaland and Arunachal Pradesh, only limited areas have been covered. The survey in Mizoram undertaken is expected to be taken up in 1981-82. Reports of the surveys already carried out in Manipur, Tripura, Meghalaya, two districts of Assam, four districts of Arunachal Pradesh and Tuli Catchment of Nagaland are available though some are only in draft form.

8.5 The material available from the pre-investment survey of forests brings out the need to assess forest resources more carefully. The pre-investment survey in Manipur has revealed that 22% of the forest area is under bamboos and open forests account for 27% of the forest area. In Tripura, the survey revealed that though forest lands constitute 57% of the total land area, the forest are poorly stocked and deficient in mature forest stock. The Sixth Five Year Plan for Tripura also states that 'due to reckless fellings, intensive grazing and frequent fires in the forests, the types of forests have significantly changed'. According to the Plan, the 2000 odd sq. kms. recorded as protected forests do not contain any forest worth the name except scattered trees and lower types of vegetation. The Plan also points out that the stock of bamboo which was estimated at 8 m. tonnes during 1972 has been reduced considerably due to uninterrupted jhuming in the intervening years. A similar situation may well obtain in the other States also. It is, therefore, necessary that the pre-investment survey should identify areas with low stock, medium stock and high stock both within and outside the reserved forests. This is necessary if suitable priorities are to be established on an area-wise basis for the planning of afforestation and exploitation.

8.6 The pre-investment surveys already carried out have highlighted the scope for forest based industries in the North Eastern Region. The annual availability of forest resources based on the pre-investment surveys and the estimates worked out by the State Government/Union Territory, Administrations in the region is given in Annexure 8.2.

8.7 The recommendations of the Pre-investment Survey of Forest Resources in regard to the utilisation of resources identified in the States/Union Territories in the region are indicated below in brief:

Arunachal Pradesh

The survey conducted in four districts of Arunachal Pradesh (Kameng, Subansiri, Lohit and Tirap) has pointed to the possibility of setting up of a 200 tpd. paper mill with a 70:30 bamboo hard wood mix at Balukpong and another 130 tpd. paper mill with 60:40 hardwood bamboo mix in the Lohit Tirap Area.

Assam

The study which covered 9280 sq. kms. in the Nowgong and Karbi Anglong districts of Assam has indicated a growing stock of about 143 million cubic meters. It has been suggested that a 250 tpd. paper mill and a plywood mill could be set up. Also the existing capacity can be increased.

Manipur

Based on the estimates about the availability of raw materials as indicated in the Pre-investment Surveys Reports in respect of Manipur, it has been suggested that the State Government could set up a saw mill, a plywood mill, a hard board/chip board factory and on integrated 400 tonnes per day newsprint paper mill or 250 tonnes per day writing and printing paper mill. Such a set up would provide sustenance, direct and indirect, to about 2 lakhs of people or nearly one-fifth of the population of the State. Even after meeting the requirements of industry as indicated above, it is estimated that there will still be a surplus of 12 million tonnes of hardwood and bamboo which could be sent out to meet the demand from resources-scarce States like West Bengal and Bihar.

Meghalaya

The survey conducted in Meghalaya indicates the possibility of setting up a 100 tpd. pulp and paper mill with a 70:30 bamboo pinewood mix provided the creation of plantation is increased to 1343 hectares a year.

Nagaland

The Nagaland survey which covered the Tuli Catchment area covering about 2300 sq. kms. indicated the possibility of setting up a 100 tpd. paper mill with bamboo and reeds.

Tripura

The study undertaken in Tripura has suggested that the State has enough bamboo resources to support a large pulp or paper mill of the capacity of 250 tonnes based on Bamboo and Gamari in the Fatikarai Catchment. As regards the hard wood resources of the States, it has been noted that the forests, though constituting over 53% of the total land area, are poorly stocked and also deficient in mature stock. Despite this the survey has pointed out that enough raw materials would be available to sustain a commercial plywood factory in the State. The State Government however, feels that the present yield of timber is not adequate to meet the requirements of local people and that the forests are over-exploited to meet the demand of the local people and the Government.

8.8 The recommendations on the manner in which forest resources can be utilised lay great stress on the establishment of paper mills. However, a large number of paper mills cannot be taken up together and if paper production is considered to be the main use of forest resources then much of these resources will remain underutilised for quite some time to come. In any case, paper production is not the best way of utilising hard wood and timber wood and should be done only as a last resort. Other higher value uses of these woods must be identified if the forest resources of this region are to be exploited in a rational manner.

8.9 The forest resources of the region has to be utilised in an ecologically sound manner. This requires a certain commonality of approach to the entire forest area irrespective of the nature of the value of ownership.

8.10 In the context of development of forestry in the region, the legal rights/inherent rights of the village councils/district councils vis-a-vis the power vasted with the State Governments/UT Administration would need to be examined. If this problem is not sorted out, there is very little chance for the forestry development programme to succeed as effective control to check shifting cultivation, cannot be exercised by State Governments/UT Administration.

8.11 In very Indian village, traditionally a portion of the land was reserved for the village forest. This was common property to be managed by the village elders for the benefit of all the villagers. The first to be affected by the rush for forest material by the expanding population was the village forests. Except in the very interior areas, village forests are now bare earth wherever the land has not been encroached upon. Rehabilitation has to start here. The National Commission on Agriculture made the following recommendations:

(i) Any programme of mixed forestry in the village waste lands and panchayat lands

should be such as is acceptable to the village population.

(ii) The programme should be undertaken only in such areas where the incidence of wastelands in a village or a group of villages is sufficiently high so that a part of it can always be kept apart for the satisfaction of the rights of the villagers.

(iii) The programmes should take into consideration the need for a quick yield of such produets as are the villagers' immediate concern, as such, fodder and grass should be an important component of mixed forestry to be taken up with optimum input and technology.

(iv) Income from mixed forestry should be divided equally between the Panchayats and State Governments. In addition, in the disposal of the produce from these forests there should be an element of preferential treatment including price preference to the villagers.

(v) The area whether in village or village forests or degraded forest areas or waste lands should not bear any rights and should be developed on commercial basis. The local population, particularly the poorer sections, may be given preferential treatment in disposal of the produce but under overall commereial based practices.

8.12 The above recommendations of National Commission on Agriculture on Panchayat Forests are very relevant for the north-east. The pattern of ownership of village and district councils forests may be left as at present but silvicultural control may be transferred to the Forest Department. Working Plans would be drawn up by the Department and at the time of harvest there would be a sharing of proeeeds with the concerned village/district council. This approach of course requires a substantial strengthening of forest departments in the region and also an appreciative response from village and district councils.

8.13 The forests under village and district council control provide fuel and building materials for the local population. Any programme to bring these under the silvicultural control of the Forest Department will have to be accompanied by a programme of Social Forestry to meet the essential requirements of the local population. In jhum conversion schemes, the area released from jhuming can be used for this purpose. In other areas the needs of the local population will have to be taken into aecount by the Forest Department in drawing up Working plans. A similar approach is necessary to meet the fuelwood requirement of urban areas.

8.14 The density of population in some States/UTs is very low. This sparcness of population reduces the size of the working force and thus makes the exploitation of forest resources difficult. According to the National Commission on Agriculture a Forestry Plan involving the felling of 1500 hectares will generate direct employment of more than 8000 man years according to the present method. Some of these personnel are also expected to have some technical skills. The total requirement of manpower for undertaking a large scale programme of tree felling and replanting would be very substantial.

8.15 The National Commission on Agriculture examined the problems of forestry in the eastern Himalayas in West Bengal where also there is a problem of paucity of manpower as well as transportation faeility. The NCA's analysis points out that the method of exploitation relying entirely on manual labour leads to a wastage both in felling and conversion and assesses that 40% of the total round wood volume is converted into timber. What the NCA proposed was the use of more mechanised methods for felling of trees and their conversion into logs at the stump site with the help of modern tools and transporting of logs with the help of skyline cranes from the felling site to a convenient place for sale. With this method, transport difficulties are by passed and even more importantly percentage conversion of round wood increases to nearly 80%. The example worked out by the NCA involved a conversion of hard wood timber forest by replacing mature or over mature stock by other available industrial timber species to obtain higher production per unit area. After taking into account the very substantial investments in infrastructure which would be required to reach this in accessible forests the NCA estimated the benefit cost ratio to be 1.28. The cost calculations of the NCA may be somewhat out of date, but given the fast rise in timber prices the benefit cost ratio may be even higher. The important point, however, is the very low incidenee of labour eost which over a 10 year period amount to barely 11% of total cost. The NEC should study earefully the experience of the West Bengal Forest Department in the Darjeeling area so as to draw usful lessons for resolving difficulties because of paucity of labour and transport difficulty.

8.16 It may be desirable to consider the mechanisation of forestry operations in the north-east. Such mechanisation will generate employment opportunities for educated youth and be economical at the relatively high wage rates prevalent in the region. This approach, if found feasible, will require a suitable training programme for forestry officials and workers.

8.17 Except for Assam, all other States/UTs in the region have problems of communication. In Mizoram it has been pointed out that exploitation of resources is confined to only small pockets where the local contracts can have easy access. In Meghalaya large areas of reserve forests are lying untapped in the absence of adequate and proper communication. In Nagaland the 'protected' forest area are largely inaccessible.

Though all the Governments have to construct approach roads to link certain forest reserves, the problem is gigantic and would call for very heavy investment. According to the National Commission on Agriculture one km. road is necessary for one sq. km. of forest area. On this basis, the resources required to provide adequate communication for the 125 thousand sq. kms. of forest area in the region would be enormous, even if the work is to be taken up in a phased manner over a number of years. Therefore, the provision of roads for forestry development will have to be limited to definite programmes for exploitation drawn up by the Forest Department, the Forestry Corporation or Forest based industrial units.

8.18 The problem of infrastructural development in forestry can be tackled if the infrastructural requirements are built into the scheme. The scheme should be drawn up in such a way that the cost of infrastructure, whether it be roads or ropeways or skyline crane can be recovered from the sale proceeds. If such commercially oriented schemes are prepared, they can be taken up by the financial institutions as bankable projects. Forestry exploitation plans can also be designed so as to take maximum advantage of the strategic roads which are being built in the remoter parts of the region.

8.19 The approach to forestry development in this region cannot be based merely on the conventional approach which focusses attention on products like timber, plywood, fuel wood and pulping material. There are certain other activities which need to be integrated with forestry development plans. The more important of these are oak tasar culture, the cultivation of fodder trees, horticulture, development and the collection of medicinal plants.

9. ANIMAL HUSBANDRY

.Animal husbandry is an important part of the traditional agricultural system in the north-east. For the people in this region, meat is an important element in their diet and the keeping of domesticated animals and poultry is a traditional activity in tribal households.

9.2 The present position with regard to livestock and poultry is given in Annexure 9.1. There is a clear difference in the animal holding pattern in Assam and Tripura on the one hand and the remaining five units on the other. In these five units the number of pigs and poultry is far higher than the all-India norm. Thus, the number of pigs per 100 population ranges from 11 per 100 in Mizoram to 40 per 100 in Nagaland as against the all-India average of 1 per 100. In the case of poultry the range is from 89 per 100 in Meghalaya to 272 per 100 in Mizoram against the all-India average of 25 per 100.

9.3 In spite of the large livestock population in this region, the local stocks are found to be inadequate to meet the current consumption requirement for meat and there is large scale purchase of livestock, particularly pigs and cattle from outside. Cattle from the plains are taken in large numbers to Meghalaya, Mizoram, Nagaland and Arunachal Pradesh. Similarly, there is large scale movement of pigs from Goalpara and Kamrup districts of Assam to Meghalaya through Gauhati. There is also, some ingress of pigs from Burma into Nagaland and Manipur. Though precise figures are not available in the annual imports of animals per year, in Arunachal it is believed that 9 to 10 thousands heads of cattle are brought in every year for meat.

9.4 The animal husbandry system in the hill areas is essentially meat-oriented. In some communities there are taboos against milk consumption. Because the people are meat eaters they have not attended to milk production. However, there are signs of change and a growing orientation towards milk production is evident near the urban centres.

9.5 The need for increasing the number and improving the productivity and quality of cattle, pigs, and poultry in this region is quite obvious. It appears that very little efforts were made in the past regarding organised development of livestocks in this region. Perhaps, this was largely due to the difficult terrain, lack of communication facilities etc. But sporadic efforts made through introduction of exotic breeds of pigs, cattle and poultry for crossbreeding had been quite successful. This is specially evident from the better type of pigs seen in and around urban areas in several states and the crossbreed cattle population seen in Shillong area. In view of the traditional dependence of rural/tribal population on livestock for their well being, large consumption potential, absence of any sentiments regarding slaughter that help in culling and elimination of below-standard stock, readiness to adopt improved methods, resources available by way of feeds, fodders and grasses, the region has immense potentialities for rapid development in livestock production. Development of livestock would not only help in improving the economic position of the rural people by supplementing their income but also may help in the supply of improved livestock and livestock products to other areas/markets in the country.

9.6 The data relating to available evidence on the infrastructure for animal husbandry programme is given in Annexure 9.2. Some data on the growth in production between 1974-75 and 1979-80 is given in Annexure 9.3. The data given in the Annexure 9.3 shows that considerable progress has been made in egg production in several states like Manipur and Meghalaya. Milk production is generally low in the hill states, the most striking case being Mizoram where it amounts to only a few hundred tonnes per year. During this period of five years, the growth in milk production has been as follows:

	Percentage growth 1974-75 to 1979-80
Arunachal Pradesh	33·3
Assam	22·8
Manipur	18·2
Meghalaya	22·7
Mizoram	50·0
Nagaland	47·7
Tripura	10·7

The available data also show a very sharp increase in meat production in Assam. This would have to be probed further.

9.7 Despite the growth in production in recent years, the region continues to be deficient in animal husbandry products, particularly meat. The draft 6th Plan for Meghalaya for instance, points out that per capita availability of milk is only 129 grams as against nutritional requirements of 250 grams and per capital availability of meat is 45 grams as against nutritional requirement of 90 grams. The situation would be similar in the other states also. The starting point for the animal husbandry programmes must be a clear assessment of local requirements of local milk, eggs and meat. This assessment of requirements should be the basis for planning animal husbandry development:

9.8 The development programmes for animal husbandry will involve four key elements:

(i) Crossbreeding or purebreeding to improve productivity.

(ii) Provision of appropriate economical feed;

(iii) Animal health cover, and

(iv) Arrangements for processing and marketing.

The position with regard to these and suggestions for the future for different categories of livestock are dealt with below.

9.9 Several cattle development programmes have been taken up in the region. In Arunachal Pradesh there is a Key village Block with 30 subcentres each one catering to 2-3 villages. 60 cattle upgradation centres have also been established for crossbreeding. Assam has six Intensive Cattle Development Projects, two semen banks have been established and 5 lakh cattle out of a total of 17 lakh breedable cattle have been covered by artificial insemination. In Manipur, a medium sized ICD project has been set up on the basis of an earlier key village scheme. There is a semen collection centre, four regional AI centres and 60 sub centres. Meghalaya has 2 ICD projects at Shillong and Tura and the Indo-Danish project in upper Shillong. In this state there has been a certain tradition of crossbreeding from the past. The cattle population in Mizoram is very low. However, there is a key village scheme which is proposed to be expanded to an ICD project. A Nitrogen plant is also to be installed. Nagaland has one ICD project and a key village scheme. There is a proposal to merge all these activities with one semen bank at Dimapur, six AI centres and 47 stockman centres. Tripura has 2 ICD projects and has so far done about 50,000 AIs.

9.10 The NEC has established five regional exotic bull centres for the production of exotic and crossbred bulls. In addition bull calves will be available from the foreign aided projects in Meghalaya and Assam as also from the livestock farms set up by the State Government. Many of these livestock farms are meant both for milk production for nearby townships and for purposes of breeding. The exotic beef cattle breeding farms are being established. There is a frozen semen facility at Khanapara in Assam which can service the whole region.

9.11 With regard to dairy development some progress has only been achieved in Assam where there are at present 84 dairy cooperatives with 10,000 members, servicing 4 town milk supply schemes. Three of the districts in Assam are covered under Operation Flood. There is an ambitious programme for extension of Amul Pattern of cooperativisation in urban milk supply. A few dairy cooperatives have been set up in some of the other states like Meghalaya and Tripura. A Central Dairy is being set up in Shillong, but has not yet taken off the ground. There are several chilling centres linked to rural dairy schemes in other states.

9.12 With regard to methods of crossbreeding, the region has not shifted over completely to the frozen semen technology. Natural service is provided in certain areas because of the difficulty in obtaining supplies of frozen/liquid semen. The availability of breedable bulls from the regional farms is limited. With natural service the number of cows that could be covered would be limited and the crossbreeding target of 4 lakh animals cannot probably be reached. Hence it is necessary that the frozen semen technology is extended as rapidly as is possible. If semen production at Khanapara is stepped up all that is required is the provision of nitrogen flasks and logistic support for transporting these. A certain amount of training of field staff will be required to ensure that the semen is thawed and the insemination done in the correct manner. Facilities for this purpose are available in the Assam Agricultural University and in the regional farm.

9.13 The cattle in the hill region are kept mostly on paddy straw and, in the lean season, on leaves of plants and trees. The region is rich in forage trees. In a recent study made by eastern regional station of National Dairy Research Institute a number of legume and non-legume grasses, forage shrubs, plants and trees were identified. Many of them are having very high protein and soluble carbohydrate. Because of richness of the tree leaves and grasses cows producing 10 litres of milk are given only 1 to 1½ kg. of concentrate ration when such cows in the plains are given about 4 to 5 Kg. of concentrate ration. The ICAR and the Assam Agricultural University must continue work on the utilisation of local forage crops and fodder trees. The programmes of social forestry and jhum control should include provision for fodder trees and fodder crops respectively.

9.14 Since the high rainfall and humidity of the region is not conducive for hay technology, ensilage is the answer for preserving feeds for the lean season. The ICAR research complex has developed cheap silos using locally available material for this purpose.

9.15 With regard to animal health, the ICAR Research has completed retrospective surveys which have helped to identify the important diseases, the critical periods of their appearance, the endemic areas as well as seasonal variations. There is a vaccine production facility at Khanapara which can service the whole region.

9.16 Processing and marketing facilities for milk are being built up in the region as a part of Operation Flood. As pointed out earlier, inhibitions about milk production and consumption are slowly disappearing and, wherever facilities have been provided, the people have taken

to dairying. With regard to cattle meat, organised arrangements for processing and marketing are lacking. Animal slaughter is done anywhere and any how. The establishment of proper slaughter houses is essential if the meat economy of the region is to develop. Incidentally, a modern slaughter house will also allow the utilisation of byproducts like cases and blood meal. The latter in particular is very useful for animal feed.

9.17 The cattle development programme in the northeast has made some progress. However, at least as far as meat production is concerned, the hill areas are heavily dependent on the plains. The local availability of meat will improve to some extent with the crossbreeding programme as with a given rate of culling the absolute numbers available will rise because of the earlier age of calving and the shorter inter-calving intervals. Moreover because of the higher weight of the crossbreds the quantity of meat available per animal will also be higher. However, these measures will not cover the entire excess demand. Hence it is particularly important to pursue the programme of crossbreeding of beef cattle as soon as the bulls become available from the proposed exotic beef cattle farms.

9.18 With regard to feed the fodder, the local grasses and forage trees seem to have great potential. The ICAR has done some work in analysing these. This work should be used to devise appropriate feeding schedules for cattle, using these nutritious grasses and leaves as ingredients. The resulting savings in concentrate rate cost will improve the economics of animal husbandry. The ICAR's technology for ensilage also needs to be transferred to the field.

Pigs

9.19 Piggery development has been taken up in all the states in the region. Arunachal Pradesh has a Central Pig farm and has set up 50 piggery demonstration units each with five local sows and one exotic boar. Meghalaya also has built up facilities for pig breeding, has distributed 210 pig production units. Mizoram which has a low cattle population has pursued pig production centres which is chief source of subsidiary income for nearly 60% of the families. Apart from the expansion of pig breeding farms it has taken up the distribution of pig units. In Nagaland also, piggery development has been pursued and about 760 pig units have been distributed.

9.20 The NEC has assisted in the establishment of several pig breeding farms which can produce a total of 1000 exotic boars for crossbreeding. From this same farm 1000 females can be made available for replacement of indigenous sows each year. The use of purebred boars will produce crosses with 50% exotic blood. These crosses will require high levels of nutrition and management. Hence there is a proposal to use crossbred boars for breeding for infusion of 25% exotic blood. The ICAR Research Complex has taken up extensive work on pig production and have crossbreeding programme of saddle Back, with wild boars.

9.21 Pigs are kept mainly on kitchen waste and crop residues and elaborate feed arrangements are not required. The ICAR Research Complex has studied alternative low cost feeds using locally available materials. In one experiment they used a feed composed of hotel waste (45%), rice polish (23%), standard pig feed (25%) and farm grown crops (7%). The feed conversion efficiency worked out with a feed consisting of 2 parts of standard pig feed to 1 part of hotel waste worked out to 4.25 to 5.74. On this basis, the cost of pork production came to Rs. 3.40 to Rs. 4.67 per Kg. This is well below the prevailing pork price of Rs. 12-16 per kg and demonstrates the economic attractiveness of piggery in the region. A very substantial population of pig is used for food. At present, much of this spread between the cost of production and market price accrues to the trader who brings in pigs from outside. Piggery development will have to ensure that this income is realised by local farmer. It will also benefit consumers by lowering prices.

9.22 With regard to health, the ICAR Research Complex has stressed the importance of suitable housing for pigs. They have developed low-cost designs for farrowing houses and grown pens. Regular vaccination against swine fever is desirable and the required supplies are available from Khanapara.

9.23 As far as processing and marketing is concerned, not much seems to have been done. However, there is pork processing plant in the Assam Agricultural University for training purposes. The market for processed pork must be studied and the required facilities should be built into the main slaughter house.

9.24 Pork is a preferred meat in the northeastern region and the large number of pigs in the region provide an excellent base for development. Yet the hill areas do not seem to be self-sufficient and pigs are brought in from the plains. One reason for this could be the lack of effective arrangements for procurement of local supplies from rural areas to service urban markets. The shortage of pork and its high price make piggery a particularly attractive proposition. This will require a more rapid extension of exotic breeding and arrangements for processing marketing.

Poultry

9.25 Facilities for the supply of chicks are available in the NEC Regional Poultry Breeding Farm and farms set up by the individual units. The total capacity of these farms is about 3 lakhs chicks. Infrastructure is being built up by the NEC for the production of 2.41 lakh broiler chicks.

9.26 With regard to feed, poultry generally lives on village wastes though organised poultry farming in the vicinity of urban areas has started and this requires proposed poultry feed. The principal problem in the case of poultry is the lack of effective arrangements for the marketing of eggs and broiler meat. Though this has been suggested several times not much progress has been made. The local requirement for eggs may be somewhat limited because of the high levels of meat consumption. Hence any expansion in the pace of poultry development will require more effective marketing arrangements than what obtain at present. The market for eggs and poultry meat requires close study. This may be done by the NEC.

Other Livestock

9.27 Apart from cattle, pigs and poultry there are parts of the north-east with a substantial population of goats, sheep, mithun and ducks. Facilities for exotic breeding have been established for goats and ducks. A sheep farm has been set up in Kameng in Arunachal Pradesh and is reported to be doing well. A research programme on mithun has been taken up by the ICAR.

9.28 It is essential that the duckery centre in Tripura is developed and special attention is paid to duckery in the plains. The Kameng sheep experiment should be closely followed. In Arunachal Pradesh what has been attempted is the crossing of local sheep with merino rams. In this region the orientation of sheep husbandry may have to be towards meat and wool may be subordinate. Most parts of this region have high rainfall and it may be difficult to have sheep with fine wool. Goat development and goat breeding by crossing with exotic like Saunen goats should also be pursued since goat meat will help to relieve the shortage of meat in the hill areas of the region.

Procuring and Marketing

9.29 Over the past few years many facilities for exotic breeding have been set up in the north-eastern region. This provides a base for a substantial improvement in the quality of livestock in the area. The real problem, at this stage, is to ensure an effective delivery system for the purposes of crossbreeding. With regard to feed and fodder the problem does not seem to be very acute. The region has several highly nutrition grasses and tree leaves for cattle. Pigs and poultry can be raised mainly on waste materials. As for animal health the facilities available on Khanapara and the veterinary organisations in the field provide a base for better disease control.

9.30 The principal problem lies in the field of processing and marketing. The north-eastern region has a high level of meat consumption. Despite the very favourable position with regard to livestock availability the hill areas of the region are not importers of meat. There is clearly some major organisational failure underlying this phenomena. The Committee would suggest that one reason for this failure could be the lack of effective processing and marketing arrangements. As far as milk is concerned, something is being done as part of the Operation Flood projects. The Committee would suggest that effective arrangements for procurement, processing and marketing of these products is as important as advances in productivity. Hence it would recommend that this matter be examined at a regional level by the NEC who may be asked to prepare a processing and marketing plan for livestock produce.

ANNEXURE 9.1

Livestock and Poultry

(Thousands)

State/Union Territory	Cattle	Buffaloes	Sheep	Goats	Horses & Ponies	Pigs	Other livestocks	Total Livestocks	Poultry
1	2	3	4	5	6	7	8	9	10
Arunachal Pradesh .	153	11	21	74	5	113	@	382	1,170
Assam . . .	6,796	489	51	1,258	10	397	1	8,002	8,879
Manipur . . .	305	61	2	16	1	144	9	530	1,008
Mizoram . . .	49	3	(a)	23	2	43	@	120	1,088
Meghalaya . .	471	40	20	119	6	151	@	813	1,073
Nagaland . .	93	8	(a)	24	2	238	10**	375	715
Tripura . . .	592	14	3	198	@	45	@	853	665
All India . .	1,78,380	57,380	39,995	67,515	914	6,896	9,120	3,53,338	1,38,476

NOTE : Reference year for Arunachal Pradesh, 1979 : Assam, Manipur and all-India 1973 and for other State/UT-1977 @Below 500, **relates to Mithuns :(a) 584.

Sources :—1. Directorate of Economics and Statistics, Min. of Agriculture & Irrigation, Govt. of India.
2. State Government and Union Territory Admn. for Meghalaya, Mizoram and Arunachal Pradesh.
3. Statistical Hand Book of Assam, 1976, Govt. of Assam.
4. Some Basic Statistics of Tripura, 1978.
5. Statistical Hand Book of Manipur, 1978.

As reported in Basic Statistics of North East Region, 1980, NEC.

ANNEXURE 9.2

Veterinary Health and Farms (As on 1977-78)

Item	Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura
1	2	3	4	5	6	7	8
Health							
Doctors	50	495	78	59	16	21	65
Fieldmen	..	1,714	228	155	178	131	392
Hospitals	..	26	27	1	2	39	1
Dispensaries	63	251	55	41	13	21	29
Mobile Units	6	16	1	9	3	10	3
Artificial Insemination Centres	..	212	40	66	1	41	12
Vety. aid Centres	65	..	..	30	..	..	..
Govt. Farms							
Cattle	8	8	1	2	3	5	1
Sheep	2**	1	..	1	..	2*	..
Poultry	1	12	3	7	3	4	3
Pig	1	6	3	5	3	6	4
Fodder	7	6	2	2	3	1	2
Private Farms							
Poultry	219	4	..	..	..	..	..
Pig	..	1	..	..	..	..	..

NOTE.—54 Veterinary aid Centres in Arunachal Pradesh
*Goat Farm. **One Goat Farm.

Source.—State Governments and Union Territory Administrations. As reported in Basic Statistics of North East Region, 1980, NEC.

ANNEXURE 9.3

Production of Livestock Products

	Milk 000 tonnes		Eggs Millian		Meat 000 tonnes	
	74—75	78—79	74—75	79—80	74—75	79—80
Arunachal Pradesh	22·5	30·0	16·5	22·0	0·3	0·5
Assam	340·0	417·5	270·4	279·0	0·20	17·0
Manipur	50·75	60·00	17·00	30·00	n.a.	n.a.
Meghalaya	44·0	54·0	20·8	30·0	16·2	18·6
Mizoram	0·30	0·45@	2·50	5·0	4·0	6·50
Nagaland	2·20	3·25	9·80	13·80	2·80	3·16@
Tripura	14·00@	15·5	19·0@	20·5	1·60	4·14@

@For 1977-78
NOTE : 1979-80 data is from Draft Five Year Plan.
Other data from Basic Statistics, North East Region, 1980, NEC.

10. HANDLOOMS AND SERICULTURE

HANDLOOMS

With 13.56 lakhs looms spread over the states of Assam, Manipur, Nagaland, Meghalaya and Tripura and the Union Territories of Mizoram and Arunachal Pradesh, the North-Eastern region accounts for 35 per cent of the handlooms in the country. The state-wise distribution is given below :—

	Nos. in 000
Arunachal Pradesh	100
Assam	694
Meghalaya	4
Manipur	250
Mizoram	90
Nagaland	95
Tripura	123
TOTAL	1356

10.2 Even though the handloom population is large, in terms of actual production, the contribution of this region to the total national cloth output is not commensurate. In the absence of reliable data on the flow of yarn to these states, it is not possible to estimate the production of handloom cloth in this region.

However, it has to be noted that a very high proportion of the North-Eastern handlooms are not commercially operated but mainly cater to the household demands. Also a large proportion of the looms are narrow-width 'loin looms'. Weaving is a kind of a tradition and almost every female member of the household is trained in weaving. It is undeniable that the weaving skills and design traditions in the various parts of the north-east are rich and unique. The development of this sector in the North-Eastern Region will have to concentrate on commercialisation of these skills and designs. This would involve identification of a number of products which would have market potential within the region, in the rest of the country and also in the export markets. At present since the majority of the looms operate to meet household demands there are a very limited range of products which reach the market even within the region and the total production offered in the market is commercialy not significant.

10.3 The foundation of any effective programme of handloom development in the region must necessarily lie in a suitable organisational set up. In its report on Village and Cottage Industries, the Committee has suggested a group Centre approach for servicing clusters of artisans. The same approach is relevant for the development of the handloom sector in the conditions prevailing in the North-East. To start with there has to be a thorough survey of looms in the various states and Union Territories so as to locate clusters of active loom workers who could be brought into commercially developed. It should be possible to identify at least 50 such group centres in the different states and Union Territories. Once these are identified a package of measures comprising training, loom modernisation, design and product development and market linkage should be introduced to make each of the group Centre viable and self-sustaining. For the identification of group centres an important factor to be borne in mind will be the availability of weavers who will be interested in getting themselves trained in the operation of the newly introduced wider width in the looms. Weaving as it has already been noted, is not a full-time economic activity. Most of the weavers in several areas are women. Wages, that the new looms provide to these people will have to be attractive enough to induce enthusiasm in selected areas for these projects. A further factor to be borne in mind is the wage levels obtaining in the other spheres of economic activity in the region, especially in the border-tracts.

10.4 The replacement of the loin loom by wider width looms may be the basis for the commercialisation of the handloom industry. But this has to be undertaken with a great deal of discretion and caution. Loin looms will continue to be appropriate for serving local markets. Further the loin loom in spite of the handicap of the narrow width of the cloth produced has design advantages. The texture of the loin loom cloth is acknowledged to be superior to most of the handloom production and the design possibilities are substantial in this type of weaving. The strategy has to be to locate commercial uses for this type of cloth. So far no real attempt has been made to utilise the richly embelished loin loom products of this region for production of fashion garments which can have appeal in the export market. Development Commissioner for Handlooms should take up special projects to find means of commercial exploitation of the loin loom tradition of this region.

10.5 By and large, the project for development of the handlooms in this region will involve introduction of other types of wider width looms. Given the constraints of space in the existing households, the common workshed approach is perhaps best suited for the introduction of these new types of looms. In the identified group centres over a period of 5 years about 50,000 new looms should be introduced in such common worksheds. It is estimated that the total investment for this project covering 50,000 looms will work out to Rs. 25 crores at the rate of Rs. 5,000 per loom installed, which would

cover the cost of looms, workshed and margin for working capital. An approach similar to that in carpet development scheme may be an economic answer.

10.6 The most important aspect in the introduction of the new wider width looms in the areas is training. From the operation of loin loom the weavers have acquired a high degree of skill and it should be possible for them with some amount of training to take up weaving on these new looms. In all the identified group Centres, training facilities will have to be set up. The approach should be similar to the training of carpet weavers in different parts of the country successfully taken up from 1975-76. The emphasis in these centres will be on training a sufficient number of master artisans, who in turn would train other weavers in the areas. Each of trained master artisans should attach themselves as guides to the production centres proposed to be set up in these group centres on the common workshed basis. Initially the production centres will primarily be training centres where a master artisan would impart training to selected local weavers in the operation of the new type of looms and the production of newly developed products. At the end of the predetermined training period the master artisans together with the trained weavers would form the production centres to be organised on the cooperative basis or in any other convenient form.

10.7 Since the introduction of these new types of looms will be producing varieties of cloth, which may not have ready market within the region, the necessary market support to the programme has to be carefully planned. The production Centres organised on the basis of workshed in the group centres would be attached to the already existing state level organisations for purposes of market support. This linkage has to be established from the inception so that these small productions centres are not bogged down with uncleared production. While some amount of market will be available locally and could be taken care of by the state level corporations, it is necessary to forge links with the existing marketing organisations in the handloom sector for national level marketing of the production. The NEHHDC has already taken steps to open show-rooms in the different parts of the country besides warehouses. The Committee would recommend that an important role should be played by All India Handloom Fabrics Marketing Cooperation Society which has a series of well-appointed show rooms all over the country.

10.8 A considerable amount of work has also to be done for design development and product development. Even assuming a per loom production of 4 meters per day, the total cloth production that will arise from the introduction of the proposed 50,000 looms would work out to 50 million meters. Successful marketing of this production would depend on the development of a proper product-mix which has an appeal in the markets outside the region. Development Commissioner for Handlooms has already located weavers service centres with design sections at Gauhati, Imphal and Agartala. These will have to be strengthened particularly with reference to designing and training facilities. The Committee has already taken note of the rich design traditions in the region and these design centres will have to develop a range of products based on the local designs. The Government have already decided to set up an exclusive institute of handloom technology for the North-East which is most likely to be located at Gauhati. This institute will have to play a very important role and carry out continuous research and development work. Both in regard to training and design development this institute will have to coordinate with the organisations implementing the aforesaid project.

10.9 With the introduction of commercial wider width looms the demand for yarn is bound to go up. It has been estimated at present that the yarn requirements of the region is around 20,000 bales per month. This is based on the assumption that 4 lakh looms would become commercial and the per loom consumption would be 100 kg. of yarn per annum. As against this total requirement, the current estimates of the total inflow of yarn into the region is around 3000 to 3500 bales per month. The commercialisation of handlooms throughout the project approach outlined earlier would definitely help build up the local demand to the estimated level of 20,000 bales per month. At present only 2 spinning mills exist in the region, both in Assam, and their production of hank yarn is around 500 bales per month only. Another mill is in the process of being established in Manipur. It would be desirable to set up more spinning mills in the region. Some attempts are already under way in this direction and two cooperative spinning mills in Assam and one in Tripura are being considered. The establishment of these mills however, will necessarily take some time and till then yarn has to flow into the region from the rest of the country. The distance involved and the difficult nature of the terrain push up the cost of yarn for the North-Eastern weavers. The Committee recommends that the present transport subsidy scheme should be operated on a much more liberal basis as regards yarn. The various handloom corporations and apex societies already set up in the states together with NEHHDC will have to play a more active role in the distribution of yarn.

10.10 The role of the North-Eastern Handicrafts and Handloom Development Corporation and various State Corporations set up in the States/Union Territories of the region except Arunachal Pradesh and Meghalaya has not been clearly demarcated with the result that there is

considerable overlapping and confusion. The NEHHDC should act as an overall coordinating agency for the development of the handlooms and handicrafts sector in the North-East. As mentioned earlier, one of the problems of the handlooms industry in the North-Eastern Region is the supply of yarn to the handloom weavers. The Corporation could supply the yarn upto the District level to the District Industries Centres. From these, the States agencies can take up the responsibility for ensuring that yarn reaches the handloom weavers. A process house at Gauhati has been sanctioned, NEHHDC could extend this role to cover more and more processing facilities in different areas according to demand for processing both yarn and cloth. As far as marketing is concerned, the State Corporations could concentrate on marketing in their own states while the NEHHDC would concentrate on the All-India market and for the States where such corporations have not been set up. The Corporation in collaboration with the Regional Institute for Handloom Technology could associate itself with the technical training for weavers and management training for executives at different levels. Other activities of the Corporation would include facilities for warehousing supply of credit and acting as an apex organisation in the region. Thus in short, the NEHHDC could mainly concern itself with the supply of yarn and other inputs development and supply of design, marketing assistance and training. As far as actual weaving operations are concerned, these would be supervised by the State Corporations and who would also be responsible for marketing in the local area.

SERICULTURE

10.11 The north-eastern region is a major centre of Sericulture in the country. In this region, it comprises the culture of four varieties of silk-worm, namely eri, muga, oak tassar and mulberry. Though sericulture is traditional in this area from time immemorial, eri and muga culture are more or less exclusive perogative. Oak tassar culture is, however, a recent introduction and its prospect is yet to be ascertained from the commercial point of view. The Mulberry silk industry though old and traditional in the region has not been able to come out of its old rut as such, the industry still languishes in stagnancy. The level of production of different types of silk in the region is reported in Table 10.1. There is heavy concentration of activity in Assam in all the varieties of sericulture. In case of oak tassar, Manipur is the only state where there is heavy concentration of this activity.

Ericulture

10.12 Ericulture based on castor plantation is a low return activity and is conducted to large extent for self consumption. The culture of eri silk worm (Philos amis rieni) is practised during villager's leisure hours from stray castor plantations supplemented occasionally, by other secondary food plants in case of shortage of leaves. For the tribals, the chrysalid is a delicacy and the cocoon a byproduct. The eri-cocoon is invariably spun and not reeled, and as such the eri-cocoon and yarn fetch a lower price than reeled cocoon and yarn. The production of main bulk of yarn is by *Takli*— rather a slow and tedious process. Eri hand spun yarn is valued only for men's wrapper and women's scraf. Because of lack of remunerative income, no commercial motive enters the entire operation. On an average, not more than 10-15 kg of cocoon are produced by a family in a year. In the absence of any marketing facility, the weavers are constrained to sell their fabrics at uneconomic prices to the traders. A family cannot earn more than a few hundred rupees inspite of all efforts. There is limitation in rearing of eri worm because of labour involved in procuring leaves and considerable space required for mass rearing.

TABLE 10.1

Leavel of production of raw silk during Fifth Plan

Lakh Kg

Sl. No.	State/U.T.	Mulberry			Tassar			EVI			Muga		
		1973-74	1978-79	1979-80	1973-74	1978-79	1979-80	1973-74	1978-79	1979-80	1973-74	1978-79	1979-80
1.	Arunachal Pradesh	..	..	..	..	..	..	..	..	..	..	..	..
2.	Assam	0·13	0·16	·0·08	..	..	..	1·31	1·06	1·42	0·75	0·24	0·45
3.	Manipur	neg (100 Kg)	0·02	0·02	neg (9 Kg)	0·14	0·15	neg	..	0·04	..	..	..
4.	Meghalaya	neg	neg	neg	..	..	..	..	..	0·04	..	..	..
5.	Mizoram	..	..	..	..	..	..	..	..	..	..	..	..
6.	Nagaland	..	..	..	..	..	..	..	..	..	..	..	..
7.	Tripura	neg (6 kg)	neg	neg	..	..	..	neg (602kg)	..	0·01	..	..	..

Source.—Report of Sub-Group on Sericulture, Ministry of Commerce, Government of India. page . 81 and Annexure IV,.

10.13 The main problem lies in fact that the eriworm is reared on castor leaves. The plantation of castor is expensive, if done only for eriworm rearing. Experiments in close planting of castor are necessary. It is also possible for substituting castor by Ailanthus glandulosa or Aexcel sa (Barkesseru) for rearing eriworm. Quick growing in nature, it is perennial plant with abundant foliage after proper pollarding. If Ailanthus is introduced, the plantation area can be brought down to about one-tenth resulting in considerable reduction in expenditure. Alternatively, other food plants like payam, Alianthus, gular, Kesseru need to be planted at the periphery so that uninterrupted leaf supply is assured. Rearing of eriworm on tender leaves of secondary food plants, followed by mature castor leaves (which fall off naturally) at the last stage of the worm will be helpful for economy of leaf consumption for land management and at the same time additional earning by selling of castor seeds. There is no improved appliance for spinning of eri-cocoon, which is mostly done on 'Takli' where output is very small. The new 'Ambar Charkha' for spinning of ericocoon and other silk wastes should be introduced. Cost of production of yarn would be cheap and earning per spinner would increase considerably. The most important factor in development of ericulture is consolidation with sound organisational system for production and regulating the products instead of further expansional activities. Suitable agencies should be formed to safeguard the interest of the rearers, spinners and weavers by regulating the market of cocoon, yarn and fabric with sound procurement and distribution system and proper marketing organisation. In order to exploit the rich potential that exists for ericulture, it is necessary to chalk out the following programme of action :—

(i) Organised castor plantation in specific areas by identifying farmers who are willing to undertake eri plantation and silk worm rearing.

(ii) Development of infrastructural facilities by way of setting upgrainages for supply of eri silk worm eggs to the eri rearers, organising spinning activities and decentralised basis and helping in the marketing of eri yarn.

(iii) Upgrading the existing research institution of Central Silk Board for undertaking applied research on eri culture in collaboration with State level Agricultural Institutions.

The above programme of action is urgently called for as this sector remains untapped and has to be fully exploited for creation of employment and also for utilising the eri silk yarn for clothing needs in this area.

Muga Culture

10.14 Muga-culture is also indigenous to the region. The culture of muga worm (Antheraea assama) has its own problems and peculiarities. The insect is basically a wild one. Unlike mulberry, eri or oak tasser culture, muga culture is undirectional activity in that the seed cocoons are procured invariably from the hilly tracts and worms are reared in plains. Unlike other silk worms, muga worms degenerate soon in the plains because of adverse environment in summer and winter and the whole operation is started a new every year. Muga plants of Som (Machilus odoratissima), Snalu (Litsae Polyantha) etc., take five years to grow for rearing to commence and more land is required for plantation. Production per unit area of land is less and that too is unpredictable. Consequently, the returns to a family from muga rearing are not very high, considering the arca of high land involved, particularly so if the cost of the family labour also is taken into account. Therefore, the industry is taken as a subsidiary source of livelihood only by the traditional rearers.

10.15 For lack of improved reeling methods of muga cocoon rearing is done at village level by primitive method which has its own limitations. As such the situation is fully exploited by traders in a land-locked village like Sualkuchi with about 8,000 population of weaker sex, who do the bulk of reeling at nominal wage. In muga culture, the main difficulties are non-availability of healthy seed, unpredictable harvest, uncertain rearing behaviour, natural enemies, race degeneration, difficulty of handling large number of moths, large sex ratio for laying preparation, absence of hibernating character in winter, absence of machineries for economic reeling remoteness of areas of operation and above all middlemen's interference in trade cocoon, yarn and fabric. The rearing is hazardous, cost of grainage operation is high and output of harvested cocoon is very low.

10.16 It is necessary that different categories of artisans should get their due share so that the profit margin can be ploughed back to them in order to provide incentive for increased production. The artisans, therefore, should be motivated to form cooperatives so that most of their problems could be solved in an organised manner. It is also essential to streamline the cultural operation by improved method of plantation such as utilisation of the technique of clonal production of plants. Increase in the production of quality seed is important, i.e. by increasing the seed source by intensive rearing, by preservation of seed cocoon at cold storage at 50°C for 100 days or so during summer and winter by avoiding hazardous rearing period and by utilising the hibernating strain of seed cocoon. The present practice of reeling on 'Bhir' should be substituted by more improved method of reeling. NEC is trying to evolve a sophisticated muga reeling machine with the cooperation of National Institute of Design at Ahmedabad. It has been suggested that the most important thing in muga culture is organised reeling and weaving along with the organisation of a 'Raw Material Bank' for muga cocoons

during commercial seasons for successful production of quality fabric. The basic concept of having a 'Raw Material Bank' is to organise reeling at the places of cocoon production all the year round, the concept being to streamline the entire process of production including elimination of the middlemen. It is, therefore, necessary to evolve a cocoon procurement system with a minimum price support scheme organising proper preservation centre for storage of muga cocoon along with a cocoon drying chamber, setting up of power driven reeling units and introducing control and marketing facilites for the end-products are essential for rationalisation of the industry. The Committee endorses this view. In order to step up production of Muga silk a number of important measures are called for :—

(i) Area under muga plantation should be substantially increased to make available the host plant for rearing activities.

(ii) Muga plantation which is undertaken in the forest areas should be developed on economic scale of plantation as has been done in the case of tropical arjun plantation so that rearing activities are facilitated.

(iii) A package of incentives should be provided to the muga rearers and a scheme on the lines of the Inter-State Tasar Project for increasing muga silk production should be implemented by Central Silk Board under the Centrally sponsored scheme.

(iv) Activities of the raw material bank for muga raw silk opened recently by Central Silk Board should be stepped up and arrangement should be made to ensure that the procurement of cocoons is directly from the rearers themselves and not from the middle man dealers. Further muga cocoons should be treated as minor forest produce and fair price should be assured to the rearers. Since muga rearers are part of the tribal community in the area, tribal development plan programmes should include specific projects for muga development.

Mulberry Sericulture Industry

10.17 Mulberry culture is also traditional to the region. However, because the culture is age old, there is no standard breed of silk worm in the region and the worms produced are of inferior quality. Moreover, the plantations are often of mixed varieties of mulberry which affect yarn quality adversely. By virtue of favourable climatic conditions, all types of silk worms are reared, but these are scattered over in remote areas rendering supervision and collection of cocoons difficult. It is, therefore, necessary to consolidate the culture of mulberry silk worm for a healthy development of the industry. The essential requirements of mulberry silk worm culture are (a) a suitable climate and (b) Abundant growth of mulberry leaves. All these requirements suit well in most of the states and Union Territories of the North Eastern Region. The crucial elements in the strategy for the development of mulberry culture therefore have to be the rearing of high silk yielding variety of silk worm race and improvement of leaf yields by extension of high yielding varieties and appropriate agronomic practices.

10.18 The Committee further suggest the following :—

(i) It should be examined that as to what are the varieties of mulberry which will grow profitably in this area and help in the process of increasing mulberry silk industry in this region.

(ii) Detailed trials of several varieties of silk worm, mono, bi and multivoltine should be tested out to find a suitable economic mix of varieties which can give three or four raisings a year.

(iii) In order to popularise mulberry sericulture, 10 pilot extension Centres should be set up by Central Silk Board in this Region.

(iv) Nucleus grainages of Central Silk Board should be established for production of seed cocoons and supply of commercial eggs to the rearers. As a subsequent measure the State Governments should be helped to set up grainages for production of commercial layings.

(v) As far as possible even from the begining the improved techniques of the rearing of mulberry worm successfully adopted in Karnataka, Andhra Pradesh and Tamil Nadu should be introduced in this Region also.

(vi) Arrangements for marketing of cocoons, reeling of cocoons and supply of raw silk to the weaving Centres should be undertaken.

Oak Tasar Culture

10.19 Oak tasar culture is distinct from the traditional types of sericulture discussed earlier. Oak tasar culture has been introduced into the region as one element in the attempt to improve the economic condition of the Jhumias. At present the programme has made substantial progress in Manipur, though a beginning has been made in all the other units, except in Tripura. A note on the Development of Oak Tasar Industry in Manipur is given at Annexure 10.1. To provide research and development support for Manipur Tasar Industry and other states of North Eastern Region, Central Silk Board established a Regional Tasar Research Station at Imphal. The contribution made by this research station in genetics and physiology of insect, new techniques of rearing, preservation

of seed cocoon, suitable packaging for transportation of cocoon to higher altitude, surface disinfection of eggs, new nursery techniques for raising oak seedlings, renovation of farm and raising oak plantation, reeling and spinning, extension and training etc. are given in Annexure 10.2.

10.20 The current level of production levels reached in Manipur are as follows :—

Year	Laying	Cocoon	Raw Silk
1979—80	27 lakhs	1100 kahans	12300 Kg.
1980—81	47 lakhs	3400 kahans	20000 Kg.

According to a 1969 survey there are 2 lakhs acres of oak plantation in Manipur of which, as of 1980-81 around 12500 acres were being used for oak tasar culture. The standard scheme assumes that one family will tend 2.5 acres. The income that the family can earn depends on the number of disease free layings DFLs the production per laying in terms of cocoons and the number of crops taken per year. The standard scheme assumes a 1000 DFLs per crop per hectare and 20 cocoons per DFL. With two crops this gives an output of 40 thousand cocoons. The DFLs are distributed by the Government for a charge of Rs. 5 per 100 and the cocoons are purchased at Rs. 60 per 100. The gross annual income per farmer (not allowing for the costs of family labour) estimated to Rs. 2400. The NEC paper on sericulture places the income at a lower figure of Rs. 1500 because, according to it cocoon productivity is only 12.5 per DFL.

10.21 It has been suggested that oak tasar culture can be organised to yield three crops according to the following schedule:

First crop	May—June
Second crop	July—August
Third crop	September—Octobe

However, practical experience would show that productivity and earnings can be sustained and improved by systematically rearing 2 crops and the possibility of getting earnings from third crop is yet to be adequately established. In actual practice much of the income arises from the first crop and in fact even the second crop productivity may not have stabilised.

10.22 There is abundance of oak plant all over the state of Manipur. Around 20 lakhs Oak seedlings were raised for ultilising the same for gap filling in the departmental farms as also for distribution among private farms. Considering the potential that exist for practising oak tasar on an extensive scale in the state, the State Government have to take a number of coordinated measures for achieving oak tasar silk production. Similarly in the areas of Arunachal Pradesh, Assam, Nagaland, Meghalaya and Mizoram also, Oak tasar plantation are available in an abundant measure and should be fully exploited under this programme. The Committee, therefore, recommends that oak plantation should form part of the forestry programme in this region, and programme extension facilities should be provided to increase the area under Oak plantation.

10.23 Some of the problems and measures suggested for development of oak tasar industry in this area are stated in the following paragraphs :

In oak tasar culture, production of seed cocoons is inadequate due to low effective rate of rearing and high sex-ratio for preparation of commercial layings. Most cocoons produced are used for laying preparation. For preparation of layings, seed cocoons are subjected to a period of artificial hibernation, i.e. preservation in cool environment. A more precise and efficient method i.e. preservation of the seed cocoons in cold storage should be adopted. The problem of irregular emergence can be solved to a large extent by finding out the required temperature for seed preservation. Supply of seed cocoons can be increased considerably when optimum conditions for their preservation are established.

10.24 Oak tasar worm shows a tendency of continuous degeneration affecting the vigour of the worm as well as fertility. Pure parent stocks of A. pernyi and A. roylei need to be maintained in large numbers, so that fresh hybrids can be obtained every year. The rearing of parent stocks can be intensified at the parent stock stations of Meghalaya and Manipur. Stocks of hybrids can be reared in controlled rearing houses to prevent degeneration.

10.25 A. proylei can also be reared on Castanapsis which is abundant in the foothills and in the plains. Such rearing is possible in early spring and late autumn, in order to increase the quantum of seed.

10.26 The perforated cocoons of oak tasar are utilised for preparation of 'ghicha'. The preparation is a tedious and cumbersome process. For bulk production of oak tasar yarn out of waste cocoons, 'Ambar Charkha' can be introduced. Realability of 55 per cent has been achieved in reeling of oak tasar cocoons. Standardisation of reeling and boiling processes is essential in order to achieve a production of uniform and quality reeled yarn.

10.27 Annexure 10.3 contains data regarding the results obtained at the Extension Centres of Central Silk Board in the States of Manipur, Nagaland, Arunachal Pradesh and Mizoram. The figures collected would show that oak tasar rearing can provide a substantial income—per family by practising 2 crops. This should not be regarded merely as a subsidiary occupation. But an important economic activity in this region which would lead to employment activities in other sectors like reeling, weaving, dyeing, printing, marketing, and so on.

ANNEXURE 10.1

A Note on the Development of Oak Tasar Industry in Manipur

The introduction of oak tasar in Manipur is of recent origin. The potentiality of oak tasar silkwork rearing in this region were realised when in 1968 the Director, Central Tasar Research & Training Institute, Ranchi visited Manipur and advised for the introduction of oak tasar culture in the state. Accordingly, in 1969 1st trial rearings of oak tasar worms was undertaken at the three different places, viz. Thongjao, Boljang and Motbung. The same year in August, a second crop was taken up at Boljang and Motbung. In the year 1970 experimental rearings were taken up in a private unit at Motbung in the month of March—April with 80 DFLs and with 980 eggs at Boljang (Departmental). The private unit brought 5400 cocoons while the Departmental rearing produced only 91 cocoons. The trial rearing conducted during 1969 and 1970 proved beyond doubt that oak tasar culture could be introduced in the state. It was, therefore, in the year 1971 that mass scale trial rearings were taken up and 22,385 DFLs were distributed to 47 units (including departmental) which resulted in the yield of 350,845 seed cocoons & 46300 reeling cocoons. Encouraged by the preliminary trials a Team of experts from Central Silk Board were deputed in 1972 to conduct a survey of the state and to submit a Techno-economic feasibility report for the introduction of tasar silkworm rearing on oak which grows abundantly in the foot hills of the states. The team formulated a project which envisaged aid outlay of 8.1 crores and production of 5.1 lakh kg. of silk by covering 300 village centres and generating employments 900 full time and 1 lakh part time workers. The implementation of this project was recommended to the State Government.

However, taking into consideration the limitations of trained technical persons infrastructural facility, the project was later suitably modified. The modified projects envisaged an outlay of Rs. 2.5 crores, with an annual production of 20000 kg. of silk by covering 20 village centres and generating employment for 2000 full time and 30,000 part time workers. This modified project was then taken up by the State Govt. for implementation during the 5th plan. The progress so far achieved is detailed below :

Year	Farms started No	DFLs prepared lakhs	Cocoons produced lakhs	Silk/Spun Silk produced Kg.	Employment
1974—75	10	1	16	5000	2000
1975—76	10	1	18	5000	4000
1976—77	10	6	80	8000	6000
1977—78	13	8	100	12000	8000
1978—79	14	10	225	14000	10000
1979—80	22	15	250	15000	10000
1980—81	60	30	200	15000	N.A.

Till date the state has established 42 Tasar Farms and 18 seed farms making the total to sixty. It has been seen that during the year 1980-81 in the 1st crop the state distributed 30 lakhs of DFLs which resulted in the production of 2 crores of cocoons valued at Rs. 12 lakhs and engaged about 3000 tribal families. The second crop however did not come up to the expectations which resulted in the shortage of seed cocoons & in the 1st crop of 1981-82 only 1.5 lakhs of DFLs could be produced. Then was again a set back in the 1st crop due to larval mortality and against the expectations of 15 lakhs of cocoons there was only 5 lakhs of cocoons valued at Rs. 30,000 only. There are two crops 1st crop is taken in April-May and the second crop in August-September.

The main bottleneck which has restricted the cocoon production is of availability of adequate DFLs for rearings. Since the State Government has opened 60 tasar seed farms it is envisaged that it will not take long to solve this problem.

All the cocoons produced in the State are being purchased by the State Department of Sericulture. The rates for the purchase of seed cocoons are 10 paise/cocoon while the reelable cocoons are being purchased @ 6 paise/cocoon. The poor & cut cocoons are being purchased @ Rs. 15 Kg.

The State has also started one silk reeling & spinning factory with 100 reelers/spinners, but presently only spun yarn from Tasar cocoons is being produced as bulk of oak tasar cocoons reeled in the factory is pierced. The production of reeled yarn is very much in significant. The rates for Reeled & spun yarn are Rs. 325 per Kg. and Rs. 200 to Rs. 225 while the rates for Ghicha are Rs. 150 — 175 per kg. respectively.

It is estimated that the extent of nature grown oak plants is about 80,000 hectares out of which the area presently available for tasar culture is above 4000 hectares. The rearers have plenty of plantation in the foothill which is readily available. Hence the possibility of introducing tasar plantation in the valley where paddy is grown remains very remote. However 20 lakhs oak Seedling were raised for utilising the same for gap filling in the departmental farms as also for distribution among the privarte rearers.

ANNEXURE 10.2

Contribution of Regional Tasar Research Station Imphal in the Development of oak Tasar in the North Eastern Region (1972 to 1980-81)

Establishment of R. T. R. S.

To provide Research and Development support for Manipur Tasar Project and the other States of North Eastern Region, Central Silk Board established, a Central Tasar Research Sub-Station at Imphal (Manipur) in 1970 which was raised to the status of a Regional Station in 1974. Through its relentless efforts this research station has solved many outstanding technical problems faced by oak Tasar Industry in addition it has been responsible for making available a good number of trained personnels to the states through regular training programme conducted at this station. The notable achievements and contributions made by this station during the period from 1972-73 to 1980-81 are dealt hereunder :—

Breeding and Genetics + Physiology

1. **Raising of 2nd Crop.**—Ever since its inception the oak tasar industry of Manipur was assured of only one crop in a year as majority of the purpae of-spring crop (April-May) used to be in diapause till next spring. It was with constant researches at this research station that the diapause of this insect was interferred with. by subjecting 16 hours photo periodic treatment to the cocoons of spring crop for the period of 25 days. This treatment results in emergence of moth and seed production for raising a 2nd crop which has now established as a commercial crop of oak tasar and stands regularised. It has since then doubled the output of oak tasar silk.

2. **Introduction of third crop.**—In orden to make tasar culture more remunerative attempts were made since 1977 to explore the possibility of raising a third crop. The third crop can be raised as a late autumn crop by slight adjustments in the photo periodic treatment. The first crop cocoons are divided in two batches. In one batch, the cocoons are exposed to photo periodic treatment as per the normal timing for raising the normal 2nd crop. While in 2nd batch the cocoons are exposed to photoperiodic treatment one month after the initiation of photoperiodic treatment for the normal 2nd crop. The emergence thus starts in the last week of August and the rearing could be taken up from September to November. This crop is named as late autumn crop.

Attempts to improve A Proylei.—It has been observed that fecundity and shell weight of *A, Proylei* is very poor and ranges between 50—300 eggs and 0.2g to 1.2g. respectively. Studies are afoot to improve upon existing performance of *A. Proylei* through interregional hybridisation higher commercial characters like fecundity, shell weight and uniform development. Breeding experiments conducted have shown that the selection pressure is favourable for isolation of stocks for improved fecundity, shell weight and uniform development. To avoid getting poor progenies it has since been advocated to the Sericulture Department, Govt. of Manipur to resort to selection of only good cocoons for seed purposes.

(a) **Inter Reginal Hybridisation.**—In order to study the effect of hybridisation between *A. Proylei* of different regions of Manipur (North. South, East and West) and other states like Nagaland, Mizoram, Arunachal Pradesh and Assam, inter regional hybrids were prepared and reared.

Results obtained indicated gain in different chaters over Mid-parent value. Thus it was advocated that the stocks of *A. Proylei* of a particular place can be rejuvenated by resorting to hybridization between the breeds of different region.

(b) **Interspecific hybridisation.**—In order to improve upon the existing performance of *A. Proylei* J., this species was crossed with *A. Proylei* and *A. Peryni* and reared for few generations. Results obtained revealed the gain in commercial character of *A. Proylei.* Thus it was recommended that the stocks of *A. Proylei* can be back crossed either with *A. Proylei* or *A. Pernyi for* getting higher yields.

4. **New technique of rearing.**—Being reared outdoor, the caterpillars are generally exposed to the attack of pest, predators, heavy rainfall and hailstorms resulting in heavy croplosses. The following new techniques developed at this station have resulted in increasing the effective rate of rearing from 20 to 25% as the high rate of losses in the initial stages of rearing are minimised to a very great extent.

(a) **Indoor rearing :**

(i) **Bottle method.**—Cut-twigs of oak bushes are inserted in a container (bottle) having water. The newly hatched larvae are placed on the twigs which in turn are covered with a polythene bag to avoid driage of leaves. After about five to six days when the worms have entered 2nd stage and have developed enough grip they are transferred to the oak bushes outdoor.

(ii) **Tray method.**—The indoor rearing may also be conducted by feeding the newly hatched worms in trays with the twigs. The cut portion of twigs is plugged with wet cotton which helps in keeping the leaves fresh for longer time. After about 5-6 days indoor rearing under controlled conditions the worms are transferred outside on oak bushes.

(b) **Rearing under nylon net.**—The rearing of early stage tasar worms under nylon net reduces the crop loss by protecting the worms from birds and other pest & predators, which take a very heavy toll. 12500 worms can be conveniently reared in a small nylon net (11′×12′×9′) upto the end of 2nd stage.

(e) **Regulation of worm density on bushes.**—It has been observed that frequent transfer of worms adversely effects the effective rate of rearing. The transfers are thus reduced by regulating the release of worms according to the availability of foliage on a particular bush so that their entire larval period is completed on that bush. This method reduces mortality and helps in the increase of production.

5. **Preservation of seed cocoon.**—The cocoons of autumn crop were stored at Imphal which used to result in untimely emergence of moths sporadically from middle of December to middle of March. Thus the seeds prepared were wasted as during this period suitable oak leaves for rearing are not available. The problem was therefore to delay the emergence upto middle of March so as to coineide the preparation of seeds with natural sprouting of oak leaves. It was through extensive research work for 2-3 years that this research station could advocate the preservation of autumn crop cocoons from November to middle of March, every year at places of high altitude 6,000′—6500′ ASL) *viz.*, Ukhrul and Tadubi. This technique has helped in synchronising the emergence of moths with bud-breaking resulting in maximum utilisation of cocoons for seed production during a predetermined period.

6. **Preservation of seed cocoons harvested in the second crop at low temperature at lower altitude.**—In order to avoid the loss of seed cocoons in transit the seed cocoons may also be preserved at low altitude by keeping them in cold storage where temperature should be maintained at 2°C.

7. **Suitable package for transportation of cocoons to higher altitudes.**—On the request of the Director of Sericulture, Manipur, an experiment as taken up to study the various types of packages suitable for transportation of cocoons. as the mortality during transportation of eocoons in gunny bags to higher altitude and haek was very high. Three different types of packages were taken for the study.

1. Tea chest box with perforation.
2. Bamhoo basket with frame (2′×2′×1½′).
3. Bamboo basket without frame (2′×2′×1½′).
4. Control (transport in gunny bags)

It was observed that pupal mortality was as high as 45% in the cocoons transported in gunny bags followed by Tea chests (30.56%). The mortality was lowest in bamboo baskets with or without frames (15-16%). Hence to and fro transportation of seed cocoons for preservation at higher altitude was advocated in bamhoo baskets.

8. **Control of fly pests.**—Earlier attempts made by this station in eontrolling the menace of fly pest with the use of tugon and rotten fish met with little success. The use of repellent *viz.* Turpentine oil was then taken up. So far the observations revealed that use of Turpentine oil as repellent has given encouraging results. The experiment however is still in progress.

9. **To minimise losses due to virosis through NAOH.**—It has been observed that virosis take a heavy toll of the worms during the rearing. To check the incidence of virosis, different concentrations of NAOH solution were used as spray on the foliage. The 0.5% concentration showed some promise. The experiment is still in progress.

10. **Surface disinfection of eggs with soap and formalin solutions.**—The disinfection of eggs with formalin solution alone does not remove the meconium and other sticky substances from the surface of the eggs which may be the source of secondary infection. As the larvae eat the eggshell just after hatching it is necessary to remove all the meconium from the eggshell. An experiment was therefore taken up to find out the best way to remove the meconium completely. The result obtained revealed that eggs if gently rubbed and washed first with soap solution and then with 5% formalin for 5-10 minutes loose the meconium layer completely and are throughly disinfected.

11. **Utiliszation of Uyung and Shahi.**—Manipur has mixed population of *Q. serrata* and *Q. dealbata*. Through experimentation this research station has established that out of several combinations tasar silkworms fed on *Q. serrata* in the first three stages followed by feeding on *Q. dealbata* in the later stages giving good results. This finding is of particular importance to Manipur as the mixed plantation can be meaningfully utilised for increasing tasar cocoon production.

Host Plant :

12. **New Nursery techniques for raising of oak seedlings.**—The outer seed coat of *Q. acutissima* (*Syn. Serrata*) seed is hard resulting in irregular and prolonged period of germination. This has been solved by subjecting the seed coat to mechanical scarification followed by soaking in water at normal room temperature for 48 hours.

This treatment results in 98% germination within 25 days time. The treated seed can be directly sown either in nursery beds or in polythene tubes with rooting media consisting of cowdung, compost and soil in the ratio of 1:1:1.

13. **Studies on the correlation between prunning and sprouting in oak plants.**—Periodic prunning and leaf plucking was resorted to understand the behaviour of oak plants in relation to sprouting and maturity of leaves. It was observed that during March to July if the plants were given light pruning, it accelerated the growth and sprouting was observed within 10-12 days and leaves were ready for use within 30-34 days. Similarly, it is possible to obtain suitable flush of leaf during Autumn when the temperature is low by resorting to pruning or leaf plucking though in this case the sprouting gets a little delayed. This observation is of great significance in utilizing the oak plantation for raising a third crop.

14. **Renovation of farm and raising of oak plantation at Regional Tasar Research Station, Imphal.**—When the station was handed over by the state department, the farm was having only Mulberry plantation. After the takeover, the farm was completely renovated and relaid for raising oak plantation. Presently, 11 acres are covered with oak plantation which can sustain the rearing of 5,000 DFLs annually.

15. **Disease of Q. acutissima.**—*Q. acutissima* widely growing in Manipur and Nagaland, suffers from the following diseases, the causative organisms of which were identified.

1. Sooty Mould (*Chaetophama Guarcifolia*).
2. Rust Mould (*Cronartium guercum*).
3. Powdery Mildew (*Phyillactinea corvillia*).

Studies on the measures for their control are under progress.

Reeling & spinning

16. **Studies on optimum condition for stifling and storage of cocoons.**—It has been confirmed after repeated trial that the optimum condition for stifling of A. proyeli cocoon is 80°–90°C for 4-6 hours. After stifling the cocoons can be preserved at room temperature for reeling purposes upto 32 months without any damage to reeling qualities of the cocoons where the production and reclability stands 97% cooking efficiency, 202.0g production/8hrs/4 ends and 73% reelability as against 91% cooking efficiency, 136.0g production per 8 hrs/4 ends and 37% reclability of control (one week preservation).

17. **Comparative reeling performances on conventional Trivedi reeling machine, Modified Trivedi reeling machine & C. T. R. & T. I. Reeling Machine:**—Among the three machines it is found that C. T. R. & T. I. reeling machine is best of all as regards production/8 hrs and reelability age which stand at 200g and 62% respectively. In the past the reelability of oak tasar cocoons was not more than 40% and production 60-80g/hrs. After making extensive studies and researches this station has been able to improve the reelability from 40 to 62% and the production of silk fibre 175-200 gms per 8 hrs on C. T. R. & T. I. reeling machine.

18. **Evolution of improved cooking technique for good as well as stained cocoons.**—The station has evolved improved cooking technique for reeling of good as well as stained cocoons where cooking efficiency stands at 80-90%. The techniques are detailed below :

(a) **For good cocoons.**—1-10 minutes boiling in plain water+30-60 minutes steaming at 15 p. s. i.+ soaking in 0.02—0.05% biopril 50 for 18-22 hours initially at 40-60°C and then left at room temperature.

(b) **For stained cocoons.**—30-45 minutes boiling in 0.5% Monopol soap+0.2% laboratory grade washing soda+0.3+N'10 HCl solution. +45-60 minutes steaming at 15 p. s. i. above the same solution + soaking in 0.15% biopril 50 solution for 18-22 hours initially at 40-60°C and then left at room temperature.

19. **Anilozyme-P method for cooking of oak tasar cocoons.**—The technique of cooking of oak tasar cocoons with Biopril-50 is not economical due to its high cost hence it is necessary to find out the other cheaper enzyme which could be used as a substitute for Biopril-50. Extensive studies with different enzymes have shown that Anilozyme 'P can serve as a substitute far Biopril-50. Here the special advantage is that the Anilozyme-P activates even at low room temperature of 12°C whereas Biopril-50 is effective at higher temperatures only and is much more economical than Biopril-50.

20. **Evolution of reeling technique for emerged cocoons.**—It was an old concept that the moth while emerging from cocoon cuts the fibre. But this station after extensive studies has observed that emerging moth does not cut the fibre but only disperses it without breaking its continuity and hence like intact normal cocoons they can be successfully reeled where production and reelability attained under the technology developed stands at 150g/8 hrs/4 ends and 58% respectively as against 200g and 62% in normal cocoons. From economic point of view reeling of pierced cocoons is better than ghicha/spun yarn preparation which is the normal practice till today.

21. **Studies on ghicha and charkha spinning.**—Simple soap soda boiling is found to give economic and better result when production/8 hrs and spinning efficiency stand at 172g of 15^s count and 85% while in charkha spinning the production stands at 75g/8 hrs/ of 20^s yarn count with 75% spinning efficiency.

22. **Studies or weaving of oak tasar fibres.**—The studies have been taken on loom throw and fly shuttle looms which indicate that oak tasar fibre can be successfully used for weaving of quality cloth provided that the yarn should be sized properly before and during weaving.

23. **Studies on processing oak tasar fibre.**—It has been found that oak tasar fibre can be bleached with H_2O_2, and sodium silicate which gives better and brighter look. The cloth gives very fine and shining texture like mulberry silk fabric if it is treated with stannous chloride ($Sn\ Cl_2$) solution (0.5%). It has also been observed that oak tasar fibre is having good affinity for an acid dyestuffs.

24. **Insertion of the twist of oak tasar fibre.**—In mulberry reeling silk is normally obtained in reel form which necessitates the winding in bobbin form for the subsequent operation of doubling and twisting but in case of oak tasar reeling silk is obtained directly in bobbin form. So there may not be further requirement of bobbin formation. With the idea the bobbins obtained from reeling machine can be directly fed to twisting machine eliminating the re-reeling operation carried out usually after reeling. The process is found to be successful and twist per inch (T. P. I.) can be adjusted as per the requirement.

25. **Increase of cohesion of reeled silk thread.**—The cohesion of reeled silk thread produced by Biopril-50 method is nil resulting in splitting up filaments. Therefore to increase the cochesion the reeled silk thread in bobbin form should be subjected to steaming of polyvihnyl alcohol solution (1.0%) for 20-30 minutes and then bobbin should be re-reeled.

Extension

26. All the useful findings of this Research Station have since been demonstrated before the state sericulture Department's officials in the field with reproducible results. The state department has since adopted the results passed on to them.

Training

27. This research station has been imparting training on the different aspects of oak tasar culture since 1973 to Graduates, under graduates and farmers sponsored by the Government of Manipur, Nagaland, and Mizoram under the following training programmes :—

1. Oak Tasar Culture training to graduates.
2. Intensive practical training programme for post graduate diploma course.
3. Oak tasar culture training to Matriculates.
4. Oak tasar culture training to the farmers.

The details of number of persons trained in each training programme is presented in table (1).

In addition to these training programmes this station is also imparting training to the candidates of other organisation like Khadi & Village Industry, Manipur, Institute of People's Action, Manipur. So far this station has trained 5 persons of Khadi & Village Industry and 9 persons of Institute of People's Action in the reeling & spinning of oak tasar cocoons.

TABLE 1

Oak Tasar culture Training Programme conducted at Regional Tasar Research Station, Imphal

Year	Intensive training programme for Post Graduate diploma trainees		Oak tasar culture training to graduates		Oak Tasar culture		Farmer training Programme	
	No. of trainees	Duration of training	No. of trainees	Duration of training	No. of trainees	Duration of training	No. of Trainees	Duration of Training
1973	..	..	20	6 weeks	40 (Manipur)	3 months	..	..
1974	..	..	16	3 months	40 (Manipur)	Do.	..	..
1975	7	2 months	17	Do.	38 (Manipur)	Do.	..	..
1976	18	Do.	..	..	5 (Nagaland)	Do.	..	..
1977	9	3 months	..	..	3 (Nagaland)	Do.	..	..
1978	10	7 months	..	..	8 (Nagaland)	6 Months	..	..
					4 (Mizoram)	—	..	..
1979	14	11 months	..	..	2 (Meghalaya)	One month	5	2 months
					1 (Manipur)	..	..	..
					4 (Nagaland)	6 months	..	..
					4 (Mizoram)	—	..	..
1980	13	3 months	..	..	4 (Nagaland)	6 months	8	2 months
TOTAL	71		53		153		13	

10—630 P C (ND)/81

28. **Oak Tasar Grainage Centre.**—Regional Tasar Research Station has opened one oak tasar grainage centre each in the promotional states of North Eastern Region viz. Manipur, Nagaland, Assam, Arunachal Pradesh and Mizoram. The main objective of such vast network of Grainages is to strengthen the backbone of the newly developed industry by supplying quality seeds to the rearers. Since inception these grainage centres have distributed quality DFLs details of which can be visualised from the table below :

Year	State	DFLs distributed
1979	Manipur	36810
	Nagaland	118748
	Arunachal Pradesh.	12603
1980	Manipur	50399
	Nagaland	44211
	Arunachal Pradesh.	17836

Working experiences in these centres for the last two years, it has been observed that the response in the three states namely Manipur, Nagaland and Arunachal Pradesh is very much encouraging. But in states like Assam and Mizoram, the response is poor possibly due to the non-adoption of tasar culture by the tribals.

Establishment extension Centres

For the transfer of technology from laboratory to the field and to popularise oak tasar culture in the neighbouring states, four extension centres one each in Nagaland, Assam, Arunachal Pradesh and Mizoram were established during the year 1976-77. The centres soon after their establishment took up the following programme of works.

1. Surveys extension programmes on the socio-economic conditions of villagers.
2. Feasibility studies on the rearing of the *A. proylei* and the cropping pattern to be followed.
3. Selection of site for preservation of seed cocoons.
4. Demonstration of improved & grainage rearing technique of oak tasar silk worms.
5. Seed multiplication programme of *A. proylei.*
6. Distribution of seeds to the rearers and to the respective state departments.
7. Training to farmers.

The progress made by these centres is tabulated in Table 2.

TABLE 2

Activities of Extension Centres

Sl. No.	Programme of work	C.T.R. & T.I Extn. Centre Kikruma, Nagaland	C.T.R. & T.I Extn. Centre Grampani, Assam	C.T.R. & T.I Extn. Centre Dirang, Arunachal Pradesh	C.T.R. & T.I Extn. Centre, Champhai, Mizoram
1	2	3	4	5	6
1.	Survey on plantation & rearing of villages.	8150 acres of plantation available in 27 villages nearby Kohima 5164 tribal families showed interest in Oak tasar culture.	Plantation available only nearby Garampani no concentration of tribals.	Plantation available nearby Dirang village very few tribal families are available.	Plantation available only nearby Champhai village very few tribal familics are available.
2.	Cropping pattern	Sprouting of leave observe in 1st week of April mixed population of Q. Serrata & *Q.-deal.* bata. The performance of A on Q. *dealbata* were found very encouraging i.e. 1.6-1.2g. shell weight. Two crops in a year. Spring crop April to May. 2. Autumn crop August-October.	Sprouting of leaves observe in 1st week of March. Q. Serrata plantation. Two crops in a year. Spring crop March-April, Autumn crop August-October.	Sprouting of leaves observe in 1st week of April *Q. Serrata* and Q. *Semi serrata*, Mixed population, Two crops in a year. Spring crop April-June, Autumn crop August-October.	Sprouting of leaves in 1st week of April *Q. Serrata. Semiserrata.* Two crops in a year. Spring crop April-May, Autumn crop August-October.
3.	Selection of site for preservation of seed cocoons.	Pfutesero-6500AMSL.	Shillong Peak-45001-ASL.	Bomdila-6500 ASL.	Lengtóng peak-7000 ASL.
4.	Demonstration of technique of grainage and new technique of rearing of oak tasar silk worm.	Demonstration was given to the State officials of Nagaland Govt. and private rearers of Nagaland.	Demonstration was given to the State officials of Assam & Meghalaya Government.	Demonstration was given to the State officials of Arunachal Pradesh and private rearers.	Demonstration was given to the state officials of Mizoram Government.
5.	Seed multiplication programme.	Seed multiplication programme has been underway since its inception.	Seed multiplication programme has been underway since its inception.	Seed multiplication programme has been underway since its inception.	Seed multiplication programme had been taken up for the period of 1977-79 but due to disturbed law and order situation of Mizoram the programme was discontinued due to temporary closure of E.C.

1	2	3	4	5	6
6.	Distribution of seeds to the rearers 7 State farms.	1979 year-124562 DFLs were distributed among 122 rears and state farms. Total production of year was recorded as 802340 cocoons. 1980-54375 DFLs were distributed among 48 rearers and state farms. Total production was recorded as 162444 cocoons.	1979 year—6499 DFLs were reared departmentally and harvested 54060 cocoons. No supply to the private rearers due to non-availability. 1980—3115 DFLs were reared departmentally and harvested 36852 cocoons.	1979 year—14092 DFLs were distributed among 5 rearers The total production, was recorded as 61476 cocoons. 1980—17724 DFLs were distributed among 2 rearers, States farms and Nagaland Govt. The production of Arunachal pradesh was recorded as 290758 cocoons.	1979—26196 DFLs were distributed among 10 rearers and state farm. Total production was recorded as 135743 cocoons. 1980 Centre was closed due to disturbed situation of Mizoram.
7.	Farmer training programme for two months.	1979—11 farmers trainees were trained, 1980—30 farmers trainees were trained.	No one responded.	No one responded.	No one responded.

ANNEXURE 10.3

Present Position of Oak Tasar Industry in the North Eastern States

It has been observed that the response to Oak Tasar cultivation has been quite encouraging in some of the States like: Manipur, Nagaland, Meghalaya and Arunachal Pradesh. But in the states of Assam and Mizoram the response is slightly poor due to non-adoption of tasar culture by the tribals.

While detailed data with regard to all the rearers covered by state Governments are not available with, we can indicate the results obtained by our grainage/Extension Centres which are as follows :

Year/Season	Name of centre	No. of rearers covered by the Extn. centre	Qty. of layings supplied	Total outturn of cocoons	Value of cocoons harvested	Average income per rearers (Rs).
I Crop . . .	Manipur	17	50000 DFLs	12·76 kg	1·57* lakhs	15,700	924
1980 II Crop . . .		44		31·50 kg.	1·02 lakhs	10,200	425
'80: I Crop . .	Nagaland	45 (in 5 villages)	31,228	81·895 (harvested from four villages)	8,189	227
'79: II Crop . .		77 (in 7 villages)	67,916	499471 (harvested from six villages)	49,947	757
I Crop . . .	Nagaland	59	38979	131471	13,147	223
'80: II Crop . .		12	15396	38899	3,889	324
1979 . . .	Dirang	5	14092	61476	6,147	1,225
1980 . . .	Dirang	4	3476	63743	6,374	1,593
I crop 1979 . .	Mizoram	5	6030	14883	1488	298
II crop 1980 . .		5	5688	12000	1200	240

The station did not function due to disturbed condition.

*(harvested by 24 rearers, the crop of 20 rearers were of poor quality).

As will be evident from above the Oak Tasar rearing can provide a substantial income per family from one or two crops. There is no dearth of Oak flora also. But the main bottle-neck appears to be the availability of sufficient quantity of DFLs to the rearers. This problem needs an immediate solution through the joint efforts of the State Government and the Central Silk Board.

11. INDUSTRY AND MINERALS

The North-East despite its vast resources is one of the least development regions of the country, as far as industry is concerned. The present position with regard to the development of medium and large industries is presented in Annexure 11.1 and with regard to small scale industries in Annexure 11.2. As these data show, the only significant development has been of wood based and petro-chemical units in Assam in the medium and large sector.

11.2 The industrial backwardness of the north-east has been recognised in the Report on Industrial Dispersal of the NCDBA, where the entire area has been made eligible for incentives/subsidy. The Committee has recommended a growth centre based approach and suggested the location of three such centres in Assam. As for the other States, their requirements have been included in a block allocation of 10 centres, for Jammu & Kashmir, Himachal Pradesh, the North-Eastern States (other than Assam) and the Union Territories (Para 7.15 of the Report on Industrial Dispersal, NCDBA). The Committee has suggested an organisational arrangement for these centres which will allow the implementing authorities great deal of flexibility in planning and execution. (Paras 7.18 and 7.19 of the Report on Industrial Dispersal, NCDBA). The Committee has also stressed the importance of infrastructure development at the growth centres and suggested a scheme for funding costs of the development (Para 7.29 of the Report on Industrial Dispersal, NCDBA).

11.3 The types of industries that can be promoted in the north-eastern region fall broadly within the following categories :

(i) Major raw material based industries, which in the north-east would be mainly paper, cement, and petro-chemicals.

(ii) Industries to supply local demands, where the scale of local requirements is large enough to substain an economically viable unit.

(iii) Other Small industries including agro-processing like fruit canning, meat processing, timber processing, etc.

11.4 From the point of view of medium and large industry the most promising resources are the forest wealth of the region and the substantial deposits of oil, coal and limestone. The development of horticulture and plantations can assist in the growth of small and medium agro-based industries. The growth of sericulture and the demand for yarn in the handloom sector provide a base for the development of textile industries. These along with a variety of small units for serving local consumption demands can provide the basis for a more rapid industrialisation of the area.

11.5 The exploitation of forest resources for industrial development is, to a large extent, contingent on administrative measures to reorganise control over forests which were referred to earlier. In the absence of these measures the uncertainties surrounding raw material availability may be such that units even if established may not be able to function effectively. Some forests based industries like those manufacturing tea-chests cater essentially to local demand. But certain others like ply-wood and venier and paper are oriented to national markets. The forest resources of the north-east relative to the rest of India are so substantial that there is ample scope for such national markets oriented units in this region despite its remoteness from major markets.

11.6 The oil resources of the north-east have already led to the development of refineries and petro-chemical units in the region. The growing production of oil and gas in this region will lead to further developments in this sector. The coal and limestone deposits of the region provide a base for a cement industry. However, because cement is a low value product and because the limestone deposits are in the more remote parts of the region this industry may have to be oriented essentially to local requirements.

11.7 In agro-based industries, fruit processing in the small and medium sector is an established industry. The extension and upgradation of horticulture will create some further scope for development provided the markets for processed fruits are identified and developed. At present no organised effort in this direction seems to have been made. The regional corporation for agricultural marketing may have to enter this field in a systematic way. The same situation obtains for plantation products like tea, coffee and rubber.

11.8 Textile industries based on sericulture or on yarn requirements or handlooms must be linked with the support system for these sectors. The Committee has referred earlier to the problem of yarn supply for handlooms and the possibility of establishing spinning units in the region. Co-operative or public sector investment may be the right answer in this case.

11.9 The broad indication of the resource-based industries which could be developed is based on our present knowledge of the resources of this region. However, this knowledge is very incomplete. The agricultural potential (as distinct from current production) of the region has

not been systematically assessed. Full information on the availability of forest resources is not available at the level of geographical disaggregation and detail that is required for industrial planning. With regard to mineral resources (other than oil), it appears that only 25% of the region has been surveyed systematically so far. Given the difficulty in attracting manpower from outside and the lack of a sufficient number of adequately trained local persons, it may take decades to survey the area fully. It may be desirable to follow a slightly different approach in which, in the first instance, a large part of the region is covered by first approximation survey based on exploration agencies. Thereafter promising areas could be identified and priorities set for the more detailed ground based surveys. Detailed investigations can be taken up when the prospect for the exploitation of a surveyed deposit seems sufficiently.

11.10 Resource based industries are only one of the different types of industries that can be set up in the region. There are other industries based essentially on local markets. The identification of these would have to be based on a careful survey of the present level of demand for manufactured consumer goods and intermediate goods in the region. The Committee is not aware of any such systematic study in this area. It would recommend that the NEC undertake such a study of the local demand for manufactured goods, the manner in which this is being met, the extent to which the local demand can be met by local units, the types of units, that can be set up for this purpose, the optimum scale and investment for such units, etc. One area that needs these analyses is the purchase programme of government departments and related organisations (e.g. the army). There may well be a great deal of scope for local development on the strength of this demand. Another such area is the potential for ancilliarisation arising from existing and proposed large projects.

11.11 Some assesment of the types of industrial projects that can be taken up has been prepared by the North East Industrial and Technical Consultancy Corporation (NEITCO) which did a study for NEC. Besides this, action plans have been prepared by several DICs. These Action Plans also identify a certain number of industries for which there is, on the face of it, a potential for development. These reports can provide a starting point for more detailed feasibility reports which should try and establish the feasibility and viability of the proposals and provide the basis for a bankable proposition. The feasibility reports may be commissioned by the promotional agencies of the state governments like the Department of Industries and the Industrial Development Corporations.

11.12 The firming up of project ideas must be accompanied by the process of identifying enterpreneurs. The North-East cannot be totally lacking in entrepreneurship. There will be some individuals with business acumen in trading, commercialised agriculture and traditional industries. There are also a fair number of technically qualified young people. The existing industrial base of the region, though small, will also have individuals who have the capacity to expand their operations and who can provide the required entrepreneural skill for medium scale projects. Entrepreneurship from outside the region can also play an important role particularly in the larger projects.

11.13 Entrepreneurial training programmes have been taken up by several agencies in the region, viz. NEITCO, the SISI and SIET offices in Gauhati, SBI, etc. However, the general experience is that these programmes have not been very effective and very few of the people who have been trained have, in fact, set up industrial units. The Committee has dealt with the approach to the entrepreneurial development at some length in its Report on Industrial Dispersal (Ref. Chapter IX of Report on Industrial Dispersal, NCDBA). The essential elements of these approach are (i) a coordinated inter-agency approach so that the entrepreneur when he completes his training can be 'adopted' by the relevant support organisation (e.g. the DIC) and financial institutions (e.g. the SFC or SIDC), (ii) effective training in financial, managerial and technical aspects of the proposed field of operation, (iii) preliminary work on project preparation during the training, (iv) exposure to the working of similar working enterprises, (v) effective advice and guidance during project implementation and later (vi) assistance in meeting the teething problems in the early stages of production. In addition, the entrepreneurial trainees will also have to have access to other facilities given to small entrepreneurs like the provision of factory sheds, finance, raw material supply and marketing support, etc.

11.14 The Committee has recommended a three-tier structure for entrepreneurial development, the first tier being provided by DIC, the second by the State level promotional agencies and the third by a regional centre to be set up by the IDBI. In the north-east the dependence on the third tier, may be quite substantial. Hence the committee would recommend that the IDBI should set up a regional entrepreneurship development centre in the north east. Apart from actual training, this centre should also provide guidance to other 'EDP' programmes by undertaking periodic evaluation of these programmes. The NEC can also play an important role in this task in several ways. Firstly, it can strengthen the expertise available within the region by organising training programmes for the staff of the state and district level industrial promotion organisations. Secondly, it can help the states in getting expertise from outside whenever it is required. Thirdly, it can assist the states in arranging for suitable exposure to working enterprises both within and outside the north-east region for the entrepreneurial trainees.

11.15 The development of entrepreneurship as well as the need for technical support during the construction and operation stage will require an effective institutional system. At present such an institutional system exists on paper. Most districts have DICs. There are several SIDS institutions in the area. A technical consultancy organisation (NEITCO) has been set up by IDBI. However, almost all of these institutions suffer from a lack of technical staff. Experienced local persons are not readily available and experts from outside are reluctant to go there. If small industry based on local entrepreneurship is to be developed this situation will have to be corrected. One approach would be to identify local people with some potential and arrange for them to be trained and exposed to work situations outside the region. The second would be to induct experts from outside by offering special inducements. One possible approach would be to exchange personnel between the institutions in the north east and their successful counterparts elsewhere in the country. The expert from elsewhere in the country would work in the north-east while the officer from the north-cast works in the counterpart institution to gain the necessary experience. After a fixed period of, say two years, the expert on deputation can revert back and the officer from the north-east can return. Such an arrangement could help in building up the talent in local personnel. The NEC and the DC(SSI) would have to accept responsibility for such a programme.

11.16 The Committee has recommended certain measures for ensuring that government purchase programmes and the ancillary potential of large projects is used to promote small industry development in backward areas (ref. paras 8.18, 8.20 and 8.45 of Report on Industrial Dispersal, NCDBA). The need to assess the potential in this area has been referred to earlier. However, more than just the identification of potential the specific measures required to ensure that the potential is translated into achievement is what matters. The Committee in its recommendations in the Report on Industrial Dispersal has placed a great deal of responsibility on the DC(SSI) and the State Directorates of Industry for this purpose. In the north-east the need for exploiting local demand fully for purposes of industrial development is very great. Hence the DC(SSI) would have to pay particular regard to implement its responsibilities for ancilliarisation in an effective manner in this region. It must also take the lead in ensuring that the demands arising from Central Government organisations in the region are also met to the greatest extent possible by local industry.

11.17 With regard to raw material supply the north-east is in a difficult position for those items that come from outside the region. The long distance from sources of supply raises transport costs and creates many uncertainties. Some steps to remedy this are being taken. SAIL will shortly have four stockyards in the region and STC has a local office in Gauhati for the supply of canalised items like mutton tallow. The transport cost disadvantages are covered to some extent by the transport subsidy scheme. However, actual disbursement under this scheme have been very meagre and have only amounted to Rs. 5 lakhs upto 1980-81.

11.18 The uncertainties in the supply of raw materials from outside the region would have to be reduced firstly by the extension of the national distribution network of major suppliers like STC and SAIL in the region and secondly by a more vigorous policy of raw material support by state governments. The first type of approach is being followed now by organisation like SAIL. The same approach needs to be followed by other public and private sectors/organisations involved in the supply of intermediates. As far as the second type of measure is concerned, the Committee has recommended the formation of a state level supply and marketing corporation for providing raw materials and marketing support to small and village industries. At the district level the Committee has suggested District Supply and Marketing Societies (Ref. para 8.4 of Report on Industrial Organisations, NCDBA). If the state level corporations are set up in the north-east, these can form an assessment of raw material requirements on the basis of information supplied by the DICs and arrange for the necessary supplies. With regard to the problem of transport costs, the Committee will be dealing with the whole question of the transport subsidy in greater detail in its final report.

11.19 One of the special problems of industrial units in the north-east is the lack of adequate transport capacity in certain critical areas. This is something that affects not just the prospects for industrial development but also other sectors like horticulture, plantations and forestry. It is dealt with at greater length in a later chapter.

ANNEXURE 11.1

Medium and Large Scale Industries in North-Eastern Region

(Numbers)

Class of Industries	Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura
1	2	3	4	5	6	7	8
Sugar Factory	..	3	..	..	..	1	..
Paper Mill	..	3**	..	..	..	1*	..
Oil Refinery	..	3*	..	..	..	..	..
Jute Mills	..	1	..	..	..	..	1*
Cement Factory	..	1	..	1	..	..	..
Hard Board	..	1	..	..	..	1*	..
Spun Silk Mills	..	1	1@	..	..	..	..
Cycle Factory	..	1	..	..	..	..	..
Distillery Project	..	1	..	..	..	..	..
Plywood and other wood products	2	13	..	..	2	1	..
Fertilisers	..	2	..	..	..	..	..
Chemical Industry (including petro-chemicals)	..	12	..	2	..	..	..
Miscellaneous Industries	..	7	..	..	..	..	..
TOTAL	2	48	1	3	2	5	1

*Under construction @ Spinning Mill under construction ** Two under construction

Source : Basic Statistics, North-East Region, 1980, North-East Council Sect. Shillong.

ANNEXURE 11.2

Distribution of Small Scale Industries, 1971

(Numbeirrs)

Industry Groupwise	Arunachal Pradesh	Assam	Manipur	Megha-laya	Mizo-ram	Naga-land	Tripura	Total
1	2	3	4	5	6	7	8	9
1. Food Products	..	152	10	19	14	3	37	235
2. Beverages	..	1	..	..	..	..	..	1
3. Hosiery and Garments	1	29	71	2	7	1	3	114
4. Wood Products	5	268	242	33	11	3	41	603
5. Paper Products (Pigments)	..	176	12	11	2	4	1	206
6. Leather Products	..	8	1	1	1	..	2	13
7. Rubber & Plastic Products	3	198	16	15	2	9	21	264
8. Chemicals	..	126	9	7	..	2	26	170
9. Mineral Products	1	97	7	17	2	3	8	135
10. Basic Metal Alloy Industrial (units)	..	37	1	..	..	..	3	4
11. Metal Products	1	282	58	14	11	9	51	426
12. Machinery and Parts	..	27	7	3	..	..	17	54
13. Elec. Machinery Apparatus	..	11	20	3	..	..	5	39
14. Transport Equipment and parts	..	10	6	1	..	..	..	17
15. Misc. manufacturing Industries	..	17	5	5	2	..	5	34
16. Repair and Services	..	209	20	33	9	4	26	301
TOTAL	11	1648	485	164	61	38	246	2653

Source : All India Report on Census of Small Industries Vol. I, 1976 as reported in Basic Statistics of North Eastern Region, 1980, NEC.

12. TRANSPORT AND POWER

The provision of infrastructure for production is one of the major important components of development planning. The term infrastructure includes a large number of items. In this chapter we concentrate on two key items viz. Transport and Power.

TRANSPORT

12.2 The problem of transport facilities in the north-east is very acute. It has been argued that this deficiency has been "the main reason for the backwardness of the north-east region and has created a feeling of isolation in the people" (Paper on Transport and Communication prepared by NEC, December, 1980).

12.3 Estimates of the level of originating and terminating traffic at selected points in the region have been prepared on the basis of an analysis of rail traffic data and survey of road movements by RITES for the Transport Policy Planning Project of the Planning Commission. These estimates are as follows.

TABLE 12.1

Traffic lavels in the North East 1978-79

(in thousand tonnes)

Centre	Railways		Highway	
	Originating traffic	Terminating traffic	Originating Traffic	Terminating Traffic
1. Bongaigaon	1	13	..	3
2. Dhubari	226	397	45	60
3. Gauhati	506	866	562	454
4. Lumding	217	819	108	183
5. Silchar	82	99	266	113
6. Dibrugarh	276	423	39	57
7. North Lakhimpur	994		35	30
8. Shillong	..		26	7
9. Agartala	1	18	6	5
10. Kohima	..	..	115	61
11. Aizwal	..	1	16	163
12. Hafoli (Itanagar)	..	..	1	10

Source : "Study on Model Tests & Traffic Flows" Report IV, Vol. II, Annex. 14, RITES.

Railways

12.4 The existing rail route within the region is confined practically to Assam with network just touching Nagaland and Tripura. The States of Meghalaya and Manipur and the Union Territories of Arunachal Pradesh and Mizoram are outside the railway map of the country. Even in Assam, the important district towns of Nowgong, Jorhat, Sibsagar and Tezpur are on branch lines. This is due to the fact that the existing rail network was laid mainly to serve the tea gardens and did not take into account the other needs.

12.5 Some steps have already been taken to remedy this situation. Six new railway lines are under construction to link all the units in the north-east with the rail system. A part of the existing meter gauge network in Assam is being converted to broad guage.

12.6 The National Transport Policy Committee examined the problem of rail development in backward areas and recommended that in any region where normal resources on a large scale are evidently available, an integrated plan should be evolved to develop new growth centres and promote economic activity, the provision of new rail lines being an element in such development. It has also been pointed out that this region is very dependent on supplies of essential commodities from outside and the lack of adequate rail facilities lead to uncertainties in supply and high prices.

12.7 Many proposals for new rail lines have been suggested by the NEC. Broadly speaking they fall into the following categories :

(i) A broad gauge line along the South Bank of the Brahmputra's. The present line runs north of the river and does not directly link several important towns.

(ii) Increasing capacity on the critical Lumding-Badarpur hill section which connects the Brahmaputra Valley with South Assam, Manipur, Mizoram and Tripura. The capacity in this section is fully booked and any major investments in industries like paper, south of the Mikir hills is impossible unless this is done.

(iii) Various proposals for short extensions some of which will connect capital cities like Agartala, Aizwal and Itanagar with the rail network.

12.8 The National Committee is not in a position to comment on the merits of these proposals. However, it would emphasise the need for economical transport facilities not just for industrial units but for activities like horticulture plantation, forestry and related agro-industry. The most important gap seems to be the limited capacity available to service the areas south of the Mikir hills. It will be seen from the data given in Table 12.1 that when Lumding and Silchar are compared, the proportion of road movement

is much higher in the case of Silchar. The railway lines south of the Mikir hills are being further extended into Manipur, Tripura and Mizoram. Traditionally the movement from these areas, to major markets in the rest of country may have taken place through what is now Bangladesh. Since this route is not now available except for some limited movement by inland waterways, a linkage via the Brahmaputra valley is essential. This would require that the entire section from Gauhati to Lumding and southward would have to be upgraded and its capacity increased. Already its capacity is below requirements and will be even more so once the new lines into Manipur, Tripura and Mizoram become operational. The Committee would suggest that the proposals in this regard and other proposals for rail development in the region may be examined sympathetically keeping in mind the relaxation of investment criteria suggested by the National Transport Policy Committee.

Roads and Bridges

12.9 The present position with regard to road development in the region is reported in Annexure 12.1. As this data show the length of motorable roads per 100 sq. km. is below the national average in all States except Assam and Tripura and substantially so in Arunachal Pradesh, Meghalaya and Mizoram. The lower density of roads in this region has to be seen in the context of the virtual absence of alternative transport facilities in areas outside the Brahmaputra Valley.

12.10 The peculiar problems of movement in the region are not brought out fully by statistics on road density. The structure of the network is such that quite often in the hill areas the movement from one point of the State to another may have to take place through the plains. For example the road routes from Tura in the Garo Hills to Shillong which goes via the plains. The nearest district headquarters is Ziro in Loser Subansiri district and it is 162 km away. (The distance between Ziro and Itanagar, as the crow flies is about 50 km.).

12.11 Road development is a major activity in this region and accounts for a large proportion of the plan outlay of all the States in this region other than Assam and Tripura. The NEC has taken up the construction of a number of inter-State roads of regional importance. Upto March 1980, 250 kms. of new construction and 700 kms. of improvement have been completed by the NEC.

12.12 Besides roads this region has a particular problem of transportation because it is split in two by the massive Brahmaputra whose length in the Assam plains is 720 kms. At present there is only one rail-cum-road bridge across the river near Gauhati. One bridge is under construction at Tezpur and the Government of India have approved the construction of another one at Jogihapa. Another bridge across the Dihang at Passighat had also been approved. The NEC expects to take up another bridge at Dibrugarh in the Seventh Plan. Thus with these development facilities for north-south movement across the Brahmaputra will be greatly improved.

12.13 The theoretical transport requirements of the region for optimum development are so vast that they cannot be met only over a period of time. For example, the NCA has suggested a norm of 0.75 km of road per sq. km. of forest areas. On this basis the 1.25 lakh sq. km. of forest in the north-east would require the development of 94 thousand kms. of road which clearly cannot be done in the near future. Similarly if the real density per sq. km. in this region is to reach the present national norm it would require the construction of about 2500 kms of rail length. Hence a norm based approach to transport development in the north-eastern region is infeasible.

12.14 At present stage of development transport development in the north eastern region would have to be based on the specific needs of each project and programme. Moreover, given the large gap in requirements, every attempt must be made to locate projects and programmes in manner that minimise the need for additional infrastructure. Thus market oriented horticulture can be developed fast in areas clearly served by roads. Forest based industries can be located in forest areas which can be readily opened for exploitation. The resource available for road works may be stretched further if the standards of road construction are re-examined in the light of area needs so as to identify economies in construction costs.

12.15 Development activity cannot be restricted, of course, to the places which are at present accessible by road. There will be areas where new opportunities have been identified and can be promoted if road transport is provided. The roads required for such purposes should be given priority in the general road development programme of the states, NEC and the Centre. There is a programme for the construction of strategic roads and roads required for administrative purposes. The compulsions with regard to routes and alignments differ in these cases from development roads. However, there will be many cases where such administrative and strategic roads will help to exploit potential for development. One further possibility for extending the road network is to include road development as part of a productive scheme. A commercial forestry scheme can include the required road development within the forest area. These roads can be used for other purposes. A similar approach may be possible in other sectors e.g. plantation.

12.16 The development of roads is not sufficient by itself. Industrial units and commercialised agriculture require access to regular trucking sources. Leaving out Assam the number of

goods vehicles registered in the different States is very low, the figures being as follows :

	Nos.
Arunachal Pradesh	100
Manipur	1400
Meghalaya	1000
Mizoram	500
Nagaland	800
Tripura	2200

At this level of availability it would be difficult to provide an assured service in all the parts of the region. The developments in horticulture, plantations and other sectors suggested earlier would be difficult unless trucking services are available even in the interior. The Committee would, therefore, recommend that special measures to promote road transport operations may be taken. This could take the form of concessional loans in freight transport operations or the extension of freight services by public sector road transport corporations.

Other modes of Transport

12.17 Besides road and rail, the north-eastern region offers several opportunities for movement by inland waterways. It has nearly 2000 kms. of navigable waterways, the principal one being Brahmaputra. The Assam Inland Water Transport Corporation provides some services in Assam. The Central Inland Water Transport Corporation has a service linking Gauhati with Calcutta. The possibility of taking up water transport in some of the tributaries of the Brahmaputra has been identified and areas of potential have been identified. Further development of IWT in this region would relieve the pressure on the rail and road system and needs to be pursued.

12.18 The very difficult terrain in the north-east and the difficulty in providing reasonably direct surface connections has been recognised in the provision of air services in the region both by Indian Airlines and the new third level air service, Vayudoot. The NEC has identified several areas where ropeways schemes could be taken up. These alternative mode of transport can help to meet requirements for large industrial or mining projects and would have to be considered mainly in the context of such developments.

Transport Coordination

12.19 A piecemeal approach to transport development in the region may not be very fruitful. The expansion of road transport capabilities in the interior may not serve any purpose if the carrying capacity on the road and rail trunk routes is already fully utilised. What the region requires is an integrated area transport plan that looks at the region and destination of major streams of traffic, identifies bottlenecks in the existing system and the points at which additional investments required to raise carrying capacity. The Committee understands that a major constraint lies in the limited capacity of the rail system for moving traffic into and out of the region. If this is the case then additional investments in transport facilities within the region may only serve a limited purpose since most of the major development activities likely to be taken up in the region will involve greater movement into and from the rest of India. The Committee would, therefore, suggest that a comprehensive and integrated area transport plan should be prepared for the region by the Planning Commission and the NEC. The progress of implementation of the area transport plan should be monitored by the Planning Commission.

POWER

12.20 The immense hydel potential of the north-eastern region has been referred to earlier. Of the total estimated hydel potential of 12500 MW (at 60% I. F.) 11400 MW is in the north bank tributaries which pass through very difficult terrain. Much of this potential is based on theoretical assessments and more detailed feasibility investigations are necessary.

12.21 The North Eastern Council has suggested a broad perspective plan for power development in the region which involves the creation of 12000 MW of hydel capacity and 1300 MW of thermal capacity over a 25 year period beginning 1980. Out of the additional hydel potential 7500 MW is expected to come from the Dihang Project and 1500 MW from the Subansiri Project. Both of these sites are in very difficult terrain in Arunachal Pradesh and at present are under investigation. Judging by our past experience with giant projects in the Himalayas, it is highly unlikely that the very ambitious perspective suggested by the NEC can be realised.

12.22 The NEC's perspective involves the export of substantial quantities of power from the region. The installed capacity in power plants in the region is expected to reach a level of about 1000 MW by 1984-85 at which time there will be a rough balance between demand and supply. Clearly the demand for power in the region cannot possibly increase at a rate which would absorb additional capacity of 13300 MW.

12.23 The case for the very ambitious power development plan drawn up by the NEC rests mainly on consideration of national development and national energy policy. The immense hydel potential of the region will have to be tapped sooner rather than later, in view of the rising costs of other forms of energy, particularly oil. What is required at this stage is detailed investigations and project preparations which, given the size of the projects, will naturally be a Central responsibility.

12.24 With regard to rural electrification the percentage of rural population covered is very

low compared to national norms in most of the States, the figures being as follows:

Arunachal Pradesh	24·4%
Assam	25·2%
Manipur	54·4%
Meghalaya	25·3%
Mizoram	21·4%
Nagaland	48·6%
Tripura	42·0%
All India	63·3%

Only a nominal number of pump sets have been energised. The extension of electricity to rural areas can play an important role in lift irrigation and in decentralised agro-processing. Hence the pace of rural electrification needs to be stepped up from the point of view of local development. This is more important than massive increase in generating capacity. The REC's terms for lending take into account the degree of backwardness of an area. For this purpose REC's lending in the north-eastern region should be placed in the lowest category i.e. the category with the easiest terms of lending.

12.25 There is at present certain concentration on major schemes. The hilly terrain in the north-east should offer many possibilities for micro-hydel development. These are small schemes generating 1 or 2 MW of power or even less which would serve a cluster of villages. The tail-race waters from these micro-hydels can also be used for irrigation. Micro-hydels can also be set up in remote locations which are difficult to reach through the grid. It is essential that the micro-hydel potential in the remote hill areas of the north-east is investigated and if found to be feasible and economical, a shelf of such schemes is prepared. Schemes should be taken up on a priority basis where there are possibilities of agro-processing and primary processing of forest produce. The REC should support such viable micro hydel schemes.

Sd./-
(B. SIVARAMAN)
Chairman.

NEW DELHI,
12*th November*, 1981.

ANNEXURE 12.1

Total Motorable Road Length (As on 31-3-1979)

State/Union Territory	Total Road Length	Motorable Road Length	Non-Motorable Road Length	Motorable Roads		Percentage of Motorable Road to Total Road Length
				per 100 Sq.km Area	Per thousand population	
1	2	3	4	5	6	7
Arunachal Pradesh	11553	4991	6562	5·27	9·25	43·20
Assam	56983	36159	20464	46·52	2·04	64·09
Manipur	8842	6393	2449	28·54	5·17	72·30
Meghalaya	3690	3637	53	16·16	3·12	98·56
Mizoram	2916	2946	..	13·89	7·48	100·00
Nagaland	5785	5571	214	33·16	9·74	96·30
Tripura	7836	5397	2439	51·40	3·01	68·87
Total	97605	65424	32181	25·66	2·78	67·03
All India	1694110	1344372	259738	40·98	2·13	83·81

Sources : 1. Basic Road Statistics of India, 1978-79, Transport Research Division, Ministry of Shipping and Transport.
2. Statistical Hand Book, Mizoram, 1978.

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